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DRAFT

User's Manual

For the

iMET-3150 403 MHz GPS
Upper-Air Sounding System

Unclassified

INTERNATIONAL MET SYSTEMS
4460 40th St SE
Grand Rapids, MI 49512
U.S.A.

Commercial Entity Code: 1NG75

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LIST OF WARNINGS IN DOCUMENT

WARNING

Do not use hydrogen in proximity to fire, sparks, cigarettes, etc! Do not use hydrogen in enclosed areas!

RECORD OF CHANGES

Change No.	Date	Title or Brief Description	Entered by
01	April 1, 2009	Draft Release	SOS
02	April 2, 2009	Some further updates.	SOS
03	April 2, 2009	User setup information added	JHM
04	April 3, 2009	User setup information from Rev 03 moved to appropriate sections in CHAPTER 7. Added hand tuning/pre-programmed tuning to 3.1.5. Differentiate iMetOS position information setup in 3.1.2.1. Fixed Figure 3-5 and Figure 3-6, as basestation GPS is MSL height now.	SOS
05	April 21, 2009	Made [Buttons] distinguishable. Minor corrections. Increased effective range by disabling squelch (3.1.5.1j and 3.1.5.2l) and setting RF gain to MAX.	SOS
06	July 10, 2009	Inserted CHAPTER 2 - Getting Started and Installation iMetOS Log column update Fixed Figure 3-6, as basestation GPS displays EES at that stage. Emphasize check of radiosonde GPS prior to launch.	SOS
07	October 1, 2009	Clarified Section 4.6 Split Section 2.6.2 into 2.6.1 and 2.6.2, clarified Section 2.6.1 for device name Added Section 6.11	SOS

Change No.	Date	Title or Brief Description	Entered by
08	October 30, 2009	Highlight most important chapters in foreword. Added Table 3-1 for Flight Train Preparation Added PreFlight GPS Check in Section 3.1.7.1 Added steps g - h in Section 3.1.5.1	SOS
09	March 1, 2010	User does not need to obtain Geoid height anymore. Changed iMetOS Position information in Section 3.1.2.1 Disable AFC when signal strength gets weak in Section 3.1.8.3 (specifically Figure 3-22) Added more detail to setup of iMet-1 radiosonde in Section 3.1.3 Added Section 4.7 Various other updates	SOS
10	November 2, 2010	Added battery connection info in Section 3.1.3 Updated part numbers in Table 2-1 Added CHAPTER 8 and CHAPTER 9 Perform a frequency scan prior to turning on the radiosonde (Section 3.1.3) Added De-reeler and flight train information in Section 3.1.6 Added information on the reports/messages available in iMetOS in Section 4.4.1.3.	SOS

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FOREWORD

PURPOSE

The purpose of this manual is to provide the information required to operate the iMet-3150 Upper Air Sounding System and the iMetOS Meteorological Operating System.

SCOPE

This Manual describes the characteristics and operating procedures for using the iMetOS and iMet-3150. Included is information on the following topics:

CHAPTER 1 - Theory of Operations

★ CHAPTER 2 - Getting Started and Installation

★ CHAPTER 3 - Flight Operations

CHAPTER 4 - iMetOS

CHAPTER 5 - iMetOS Utilities

CHAPTER 6 - iMetOS Setup

CHAPTER 7 - Installing/Upgrading iMetOS

CHAPTER 8 - Contacting Air Traffic Control

CHAPTER 9 - Balloon Inflation Kit

CHAPTER 10 - Contacting Support

★ CHAPTER 2 and CHAPTER 3 are the two most important chapters. These chapters detail the setup of the iMet-3150, both initially, and each time for flight. CHAPTER 3 contains the step-by-step instructions on how to operate the system for a flight.

Information about the operations of the System Computer and System Printer (if supplied) is available in the Manufacturer's Documentation and is not covered in this Manual.

 Use or disclosure of this information is subject to the restriction on the cover page of this document.

Table 1-1: List of Abbreviations and Captions

Abbreviation	Explanation
°	Degree
°C	Degrees Celsius
°F	Degrees Fahrenheit
%	Percent
2D	Two-Dimensional
3D	Three-Dimensional
aaa	Ascension Number
AC	Alternating Current
AFC	Automatic Frequency Control
AGL	Above Ground Level
ASCII	American Standard Code for Information Interchange
ASOS	Automated Surface Observing System
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
Az	Azimuth
CD	Compact Disc
CGA	Compressed Gas Assocation
COM	Communication
cm	Centimeter
CTAF	Common Traffic Advisory Frequency
dB	Decibel
dBm	Decibels relative to 1 milliwatt
DC	Direct Current
DEWP	Dewpoint
DVD	Digital Video Disc
DWORD	Double Word
E	East
EES	Earth Ellipsoid
El	Elevation

Abbreviation	Explanation
ESD	Electrostatic Discharge
F	Frequency
FBO	Fixed-Base Operator
FL	Flight Level
FM	Frequency Modulation
Freq	Frequency
Frq	Frequency
ft	Feet
gm	Grams
GND	Ground
GPS	Global Positioning System
GUI	Graphical User Interface
HGT	Height
hPa	Hectopascal
ID	Identification
IF	Intermediate Frequency
IP	Internet Protocol
kg	Kilogram
kHz	Kilohertz
km	Kilometer
kt	Knot
Lat	Latitude
Li-Ion	Lithium Ion
LNA	Low Noise Amplifier
Long	Longitude
LOS	Line-of-sight
m	Meter
m/s	Meters per second
MB	Megabyte
mb	Millibar
mbar	Millibar
MHz	Megahertz

Abbreviation	Explanation
min	minute
mm	Millimeter
msec	Millisecond
MSL	Mean Sea Level
N	North
N/A	Not Applicable
NE	Northeast
nm	Nautical Mile
NW	Northwest
NWS	National Weather Service
oz	Ounces
p/n	Part Number
PC	Personal Computer
Press	Pressure
PSI	Pounds per Square Inch
PTU	Pressure, Temperature and Humidity
rad	Radians
RDF	Radio Direction Finding
REC	Receiver
RF	Radio Frequency
RH	Relative Humidity
rrr	Release Number
Rx	Receiver
s	Seconds
S	South
S	Strength
SE	Southeast
Sig	Signal
Sonde	Radiosonde
Srch	Search
SW	Southwest
SYS	System
Temp	Temperature
TX	Transmit

Abbreviation	Explanation
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
UTM	Universal Transverse Mercator
V	Volt
V.Temp	Virtual Temperature
VS	Vertical Speed
W	West
W.D.	Wind Direction
W.S.	Wind Speed
WMO	World Meteorological Organization
Wx	Weather
yyyy	4-digit year

LIST OF RELATED PUBLICATIONS

Icom

A-6353H-1EX-2	IC-R20 Instruction Manual
A-6452H-1G	Lithium-Ion Battery Precautions
A-6156D-1EX	Ham Radio Terms

SAFETY SUMMARY

GENERAL SAFETY INSTRUCTIONS

This manual describes physical processes that may cause injury or death to personnel, or damage to equipment if proper procedures are not followed. General safety precautions and instructions must be understood and applied during operation and maintenance to ensure personnel safety and protection of equipment. Prior to performing any task, all WARNINGs, CAUTIONs and NOTEs applicable to the task shall be reviewed and understood.

WARNINGS, CAUTIONS AND NOTES

WARNINGs and CAUTIONs are used in this manual to highlight operating or maintenance procedures, practices, conditions or statements that are considered essential for the protection of personnel (WARNING) or equipment (CAUTION). WARNINGs and CAUTIONs immediately precede the step or procedure to which they apply. WARNINGs and CAUTIONs consist of four parts: heading (WARNING or CAUTION), a statement of the hazard, minimum precautions, and possible result if disregarded. A NOTE is used in this manual to highlight operating or maintenance procedures, practices, conditions or statements that are not essential to the protection of personnel or equipment. A NOTE may precede or follow the step or procedure, depending upon the information to be highlighted. The headings used and their definitions are as follows.

WARNING

Highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in injury to, or death of, personnel or present a long term health hazard.

CAUTION

Highlights an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in damage to, or destruction of, equipment or loss of mission effectiveness.

NOTE

Highlights an essential operating or maintenance procedure, condition, or statement.

PHYSICAL INJURY

The iMet-3150 contains no moving parts and emits no hazardous radiation. Individual components can be heavy and awkward to handle. Care should be taken to use proper lifting techniques whenever a component is being moved. Failure to handle these assemblies properly could result in personal injury and damage to the equipment.

CAUTION

Some maintenance procedures require the use of a wrist or ankle strap to prevent damage to electrical equipment resulting from electrostatic discharge (ESD). Equipment must be completely disconnected from all power sources before attaching wrist or ankle straps. Failure to disconnect power from wrist or ankle straps could result in personal injury from electrical shock including death and damage to the equipment.

CHAPTER 1
THEORY OF OPERATIONS

1.1 INTRODUCTION

System operations should not be undertaken until the system has been properly installed and tested according to the manufacturer's instructions.

As described in this Manual, the iMet-3150 consists of the following components:

1. Icom IC-R20 Receiver
2. Radiosonde Decoder
3. iMetOS Meteorological Operating System
4. iMet-1 Radiosonde

The first three elements are referred to collectively as the iMet-3150, or ground station. Please refer to Figure 1-1 and Figure 1-2 for system block diagrams.

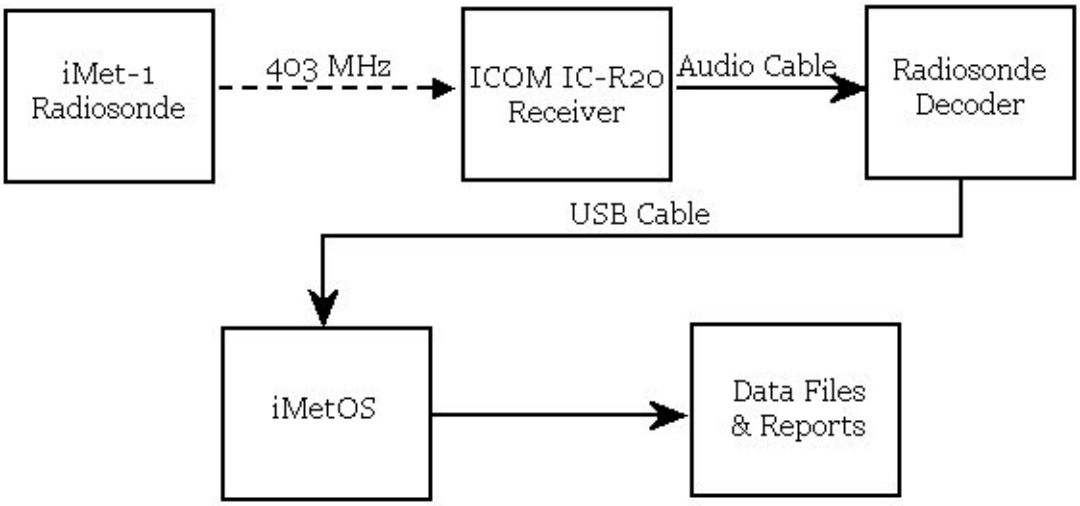


Figure 1-1: iMet-3150 Block Diagram

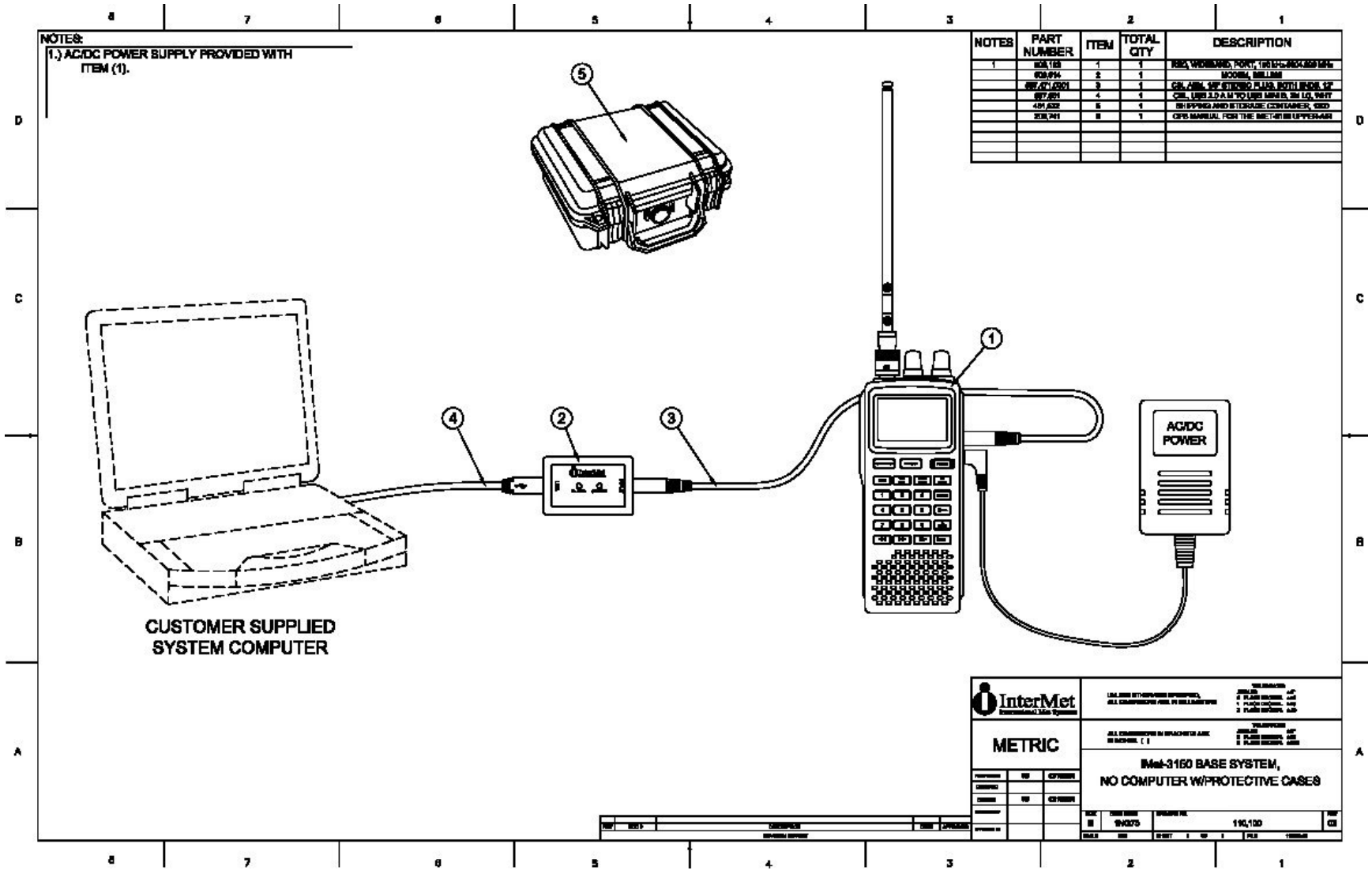


Figure 1-2: iMet-3150 System Diagram

Use or disclosure of this information is subject to the restriction on the cover page of this document.

1.2 THEORY OF OPERATIONS

The iMet-3150 is an automated sounding system that operates in the 403 MHz meteorological frequency band. Pressure, temperature and humidity data is collected by the radiosonde and transmitted to the ground station by a digitally coded message sent once per second. The radiosonde includes four AA-type alkaline batteries that provide power to the sensors, digital processors and transmitter.

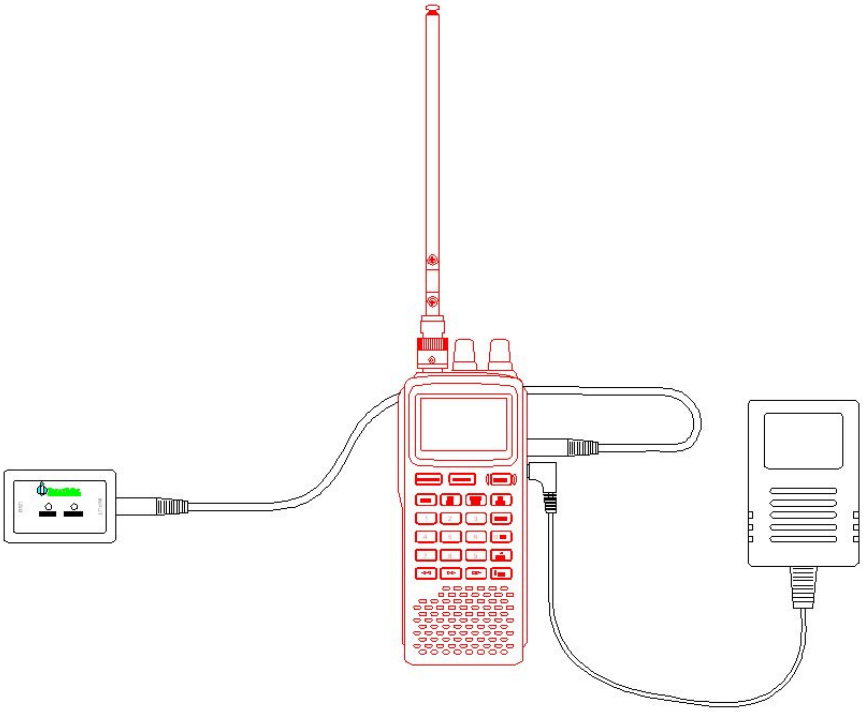


Figure 1-3: iMet-3150 Receiver and Decoder

The telemetry from the radiosonde is received by a passive, omnidirectional 403 MHz antenna on the Icom IC-R20 receiver. The demodulated signal is passed over a standard audio cable to the decoder

1.2.1 GPS Wind Finding with Differential Correction

The radiosonde includes a C-Code GPS receiver that locates the sonde in three dimensional space and transmits this information to the ground station along with the PTU data. This information is processed in the iMetOS meteorological processing software to produce wind speed and wind direction.

1.2.2 Demodulation and decoding

The Icom IC-R20 receiver demodulates the FM signal received from the radiosonde and passes base band information to the decoder. The decoder converts the base band signal to binary format which is then converted into a format that can be transmitted over the USB to the System Computer.

The System Computer receives the PTU data and the radiosonde GPS data, which is then processed by the iMetOS into meteorological data and met products such as TEMP, CLIMAT and STANAG reports. iMetOS also provides graphical displays, data communications and archiving capabilities.

CHAPTER 2
GETTING STARTED AND INSTALLATION

2.1 INTRODUCTION

Installation of the iMet-3150 involves hardware setup and software/driver setup. Installation can be completed in either order.

The hardware installation describes setting up the system, as typical, for a flight. A full hardware installation is not required for the installation of the software.

2.2 INSTALLATION CHECKLIST

Prior to beginning the installation, ensure that all of the following parts listed in Table 2-1 are on hand (refer to Figure 2-1):

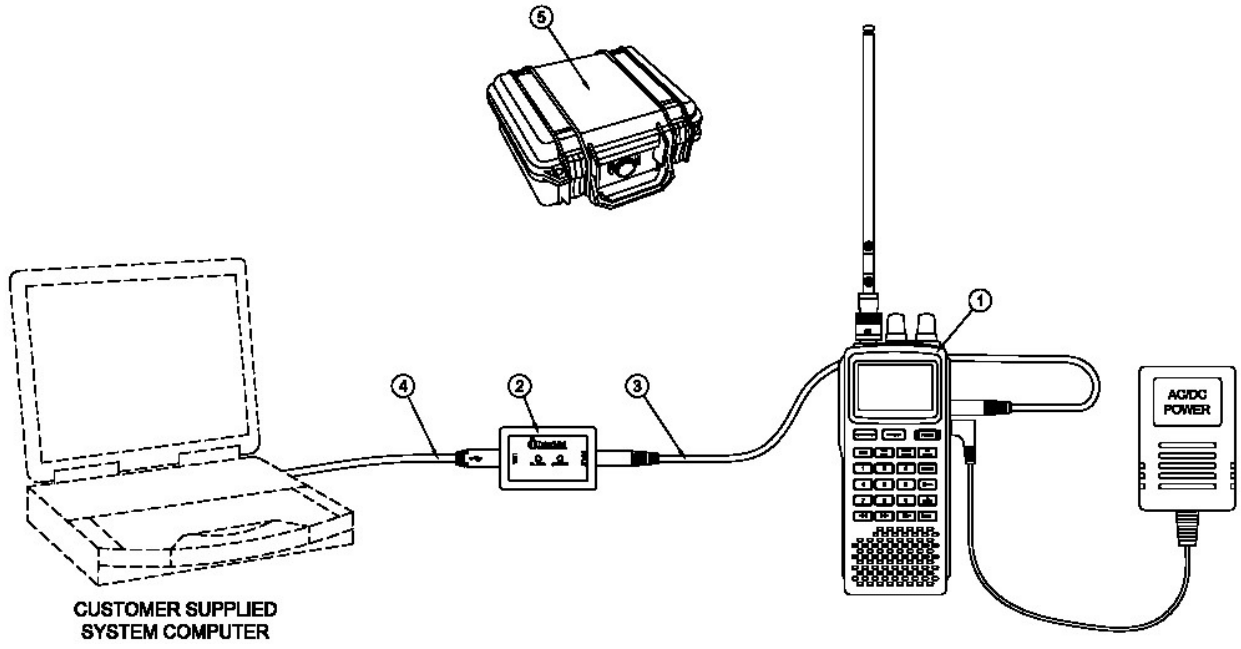


Figure 2-1: iMet-3150 Components

Table 2-1: Parts Required for Use

✓	Item	Description	InterMet Part Number
	N/S	CD with Software, Drivers, and Documentation	693150.*xxxx* (*varies*)
	1	Icom IC-R20 Receiver, with AC Power Supply and Antenna	100,426
	2	Decoder	100,423

✓	Item	Description	InterMet Part Number
	3	Audio Cable	597,471.0001
	4	USB Cable	567,061
	5	Transportation Case	100,425
	N/S	403 MHz Flexible Whip Antenna (Optional)	100,514
	N/S	System Computer Power Cord	Optional / Varies
	N/S	System Computer	Optional / Varies
	N/S	Balloon Inflation Kit	100,438

2.3 SOFTWARE INSTALLATION

Before beginning, the iMet-3150 software must be installed on the System Computer. If a System Computer has been supplied by InterMet Systems, this has already been done at the factory. Advance to Section 2.6.

2.3.1 iMetOS Installation

Software installation is a simple process. The iMetOS, required to run the iMet-3150 Upper-Air Sounding System, is included on a CD included with the system. Install the software as follows:

a. Power the System Computer and log into Windows as normal.

b. Insert the software CD into the System Computer's CD/DVD/Blu-Ray drive.

c. Browse to the iMetOS directory on the CD and execute the Setup application.

d. Follow the prompts as normal. The software will install in the C:\IMS\iMetOS directory.

Installation of the iMetOS is complete. An icon can be found on the Desktop and in the Start Menu | Programs | InterMet Systems menu.

2.3.2 Software Configuration

Software configuration must be done after the driver installation, as the COM ports must be known and working prior to configuring the software.

2.4 DRIVER INSTALLATION

Before beginning, the iMet-3150 drivers must be installed on the System Computer. If a System Computer has been supplied by InterMet Systems, this has already been done at the factory. Advance to Section 2.6.

The Decoder must first be connected to the System Computer prior to beginning.

2.4.1 Connect the iMet-3150 Decoder

If not already done, connect the Decoder to the System Computer as follows:

a. Power the System Computer and log into Windows as normal.

b. Connect the Decoder to the computer with the USB cable.

2.4.2 Install the Drivers

Install the drivers required for communication with the Decoder as follows:

a. Insert the software CD into the System Computer's CD/DVD/Blu-Ray drive.

b. Verify that the receiver is off and the audio cable is disconnected from the decoder. Connect the USB cable to an available USB port on the System Computer.

NOTE

It is advisable to choose a USB port that will always be convenient to use. Each time the decoder is plugged into a different USB port, the drivers may re-install on the System Computer. The COM ports may change, thus requiring the MetServer settings to be changed or the COM port assignment to be changed.

c. Windows will start the Found New Hardware wizard to install the drivers.

d. Choose "Install from a list or specific location (Advanced)" and hit [Next >].

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install software for:
USB Serial Port
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

Figure 2-2: Found New Hardware Wizard

e. Select "Search for the best driver in these locations." Then select "Include this location in the search," click [Browse].

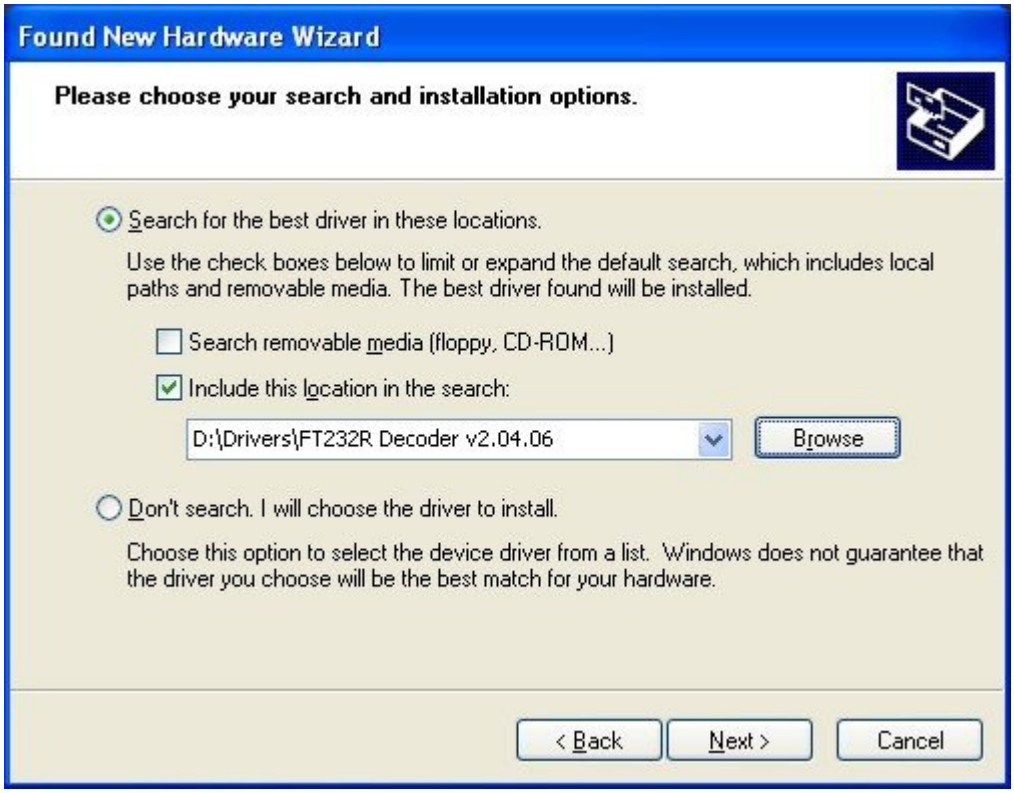

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
D:\Drivers\FT232R Decoder v2.04.06
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

Figure 2-3: Search for the Best Driver In Location

f. Browse to the location of the FT232R USB Serial Port drivers, located on the Installation CD under Drivers\FT232R Decoder v*x.x.x*. Click [OK].

g. Select [Next >] once the path is specified.

h. The wizard starts searching for the driver. After the driver is found, the "Hardware Installation" dialog may appear indicating that the driver is not digitally signed or has not passed Windows Logo testing. Select [Continue Anyway] to continue.

i. The wizard begins copying the files.

Figure 2-4: Copying Drivers

j. After the installation is completed, select [Finish] to continue.

Figure 2-5: USB Serial Port Driver Installed

k. This process may repeat. Most likely, no additional user input is required to install the second USB Serial Port and a series of normal USB activation noises will be heard. If it does require additional user input, simply follow these steps from Step c again.

At this point in time, Windows may erroneously detect a serial mouse on one of the newly installed COM ports. This will be evident if the mouse cursor moves without any user input. If this is the case, unplug the USB cable from the iMet-3150 Decoder or System Computer and proceed with Section 2.5.

2.5 DISABLING SERIAL MOUSE DETECTION

In certain instances, Windows will erroneously detect a serial mouse on the COM port required for communication with the iMet-3150. Follow these steps to prevent this from happening:

a. Reconnect the Decoder to the System Computer with the USB cable. Do **not** connect the audio cable.

b. Go to the Start Menu | Control Panel.

c. Open System.

d. Select the [Hardware] tab and hit the [Device Manager] button.

e. Expand the Ports (COM & LPT) group.

f. Right click on the USB Serial Port (COM*x*) and select Properties.

g. Open the [Details] tab and select "Device Instance Id" in the pulldown menu. For Windows 7, select "Device Instance Path" from the pulldown menu.

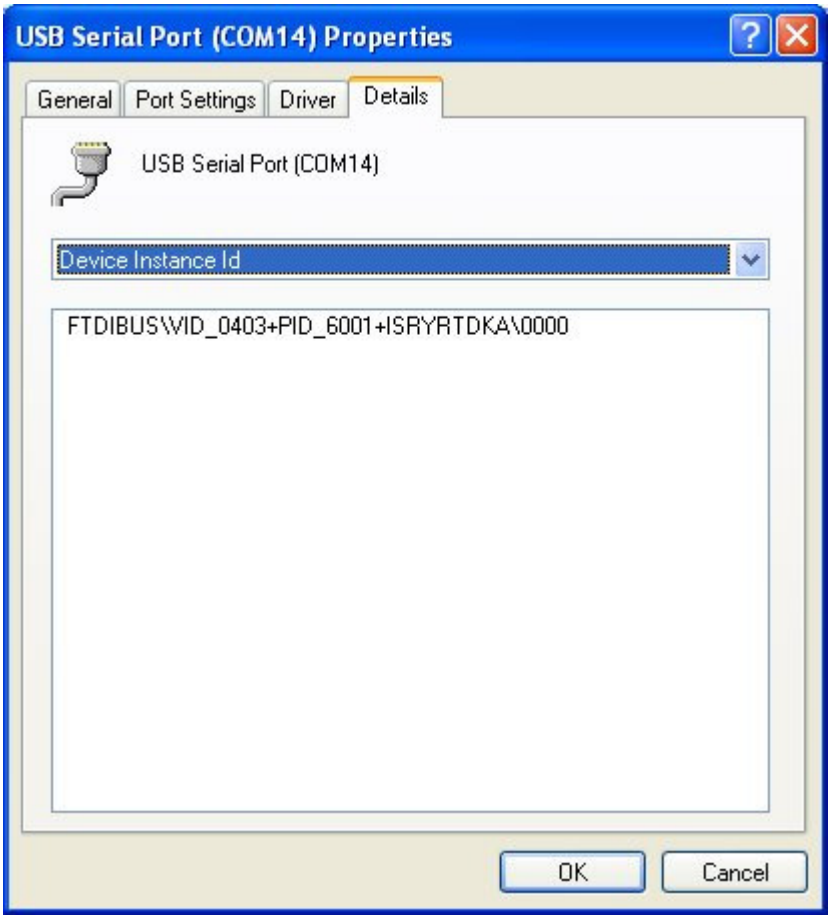


Figure 2-6: Device Instance Id

h. Make a note of the text in the lower box. The text reads of the form ***Enumerator* \ *DeviceID* \ *InstanceID*.**

Table 2-2: COM Port Registry Parameters

Enumerator	DeviceID	InstanceID
FTDIBUS		0000

i. Hit [Cancel].

j. Click [OK] to close the USB Serial Port properties.

k. Close the Device Manager window.

l. Click [OK] to close the System Properties window.

m. From the Start | Run menu, type "regedit" and click OK to start the Registry Editor.

n. Browse to **HKEY_LOCAL_MACHINE \ System \ CurrentControlSet \ Enum \ *Enumerator* \ *DeviceID* \ *InstanceID* \ Device Parameters** where *Enumerator*, *DeviceID*, and *InstanceID* are given by Table 2-2 above in step h.

o. Go to Edit | New | DWORD Value.

p. Type in the name "SkipEnumerations" for the value name.

NOTE

The value name is case sensitive. Type "SkipEnumerations" exactly as shown, without the quotation marks.

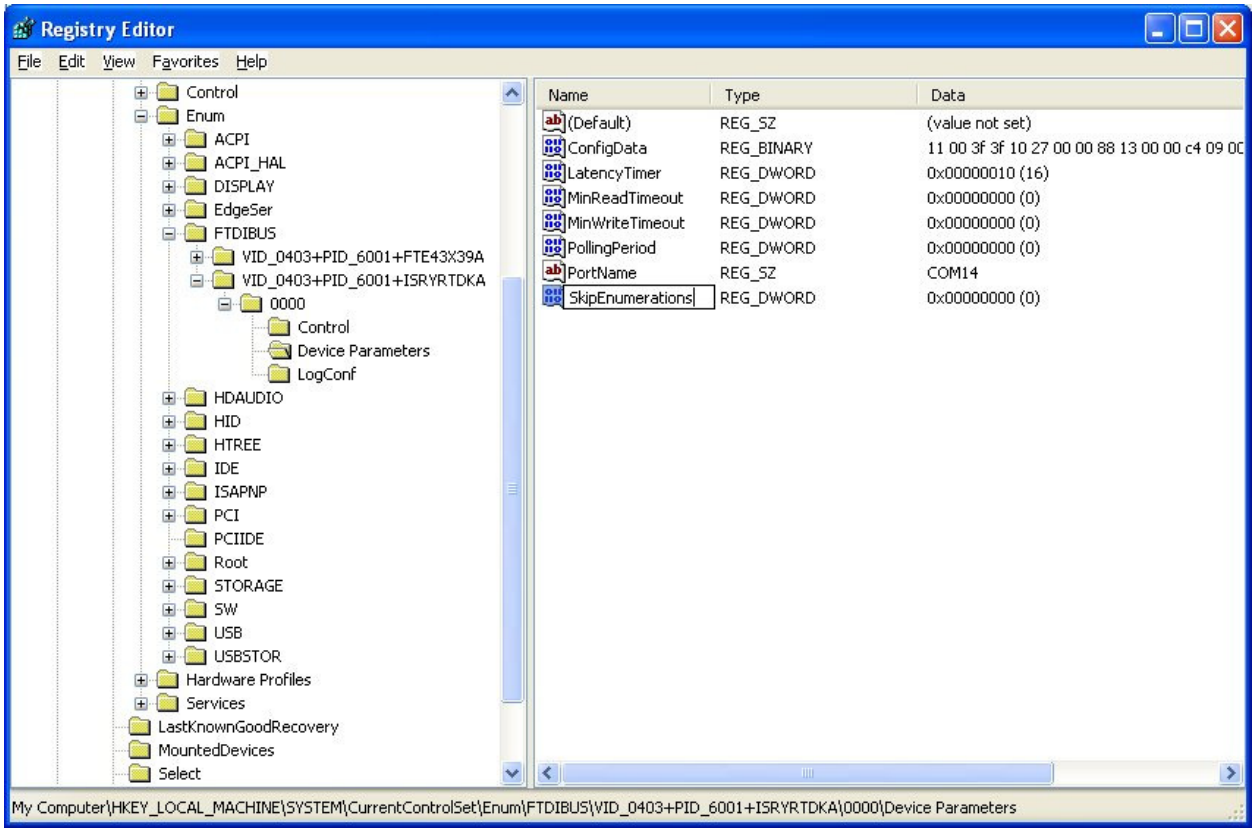


Figure 2-7: Enter Value Name

q. Hit [Enter] or double-click to edit the DWORD value.

r. Type "FFFFFFFE" and select the Hexadecimal base, as shown in Figure 2-8. Note that this is not case sensitive.

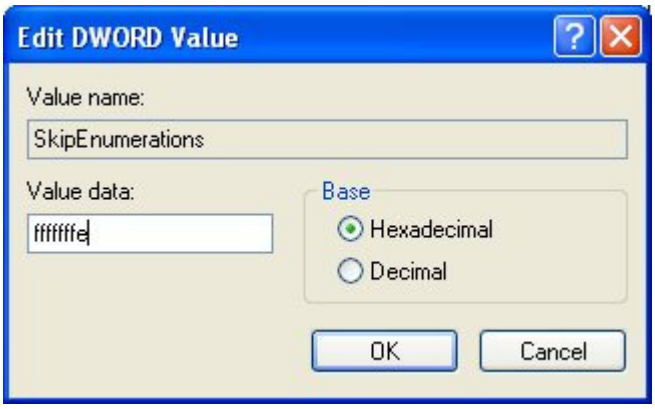


Figure 2-8: Enter DWORD Value

s. Hit [Enter] or click [OK].

t. Close Registry Editor.

u. Reboot the computer.

At this stage, the computer is now protected from erroneously recognizing the decoder as a serial mouse. If at any time the mouse jumps all over the screen, verify that the SkipEnumerations DWORD value has been added to the appropriate Device Instance Id. Note that if the decoder has been replaced or plugged into a different USB port, the Device Instance Id may have changed.

If the registry is properly edited and the problem still exists, please contact InterMet Support as defined in CHAPTER 10.

2.6 SOFTWARE CONFIGURATION

After the software and drivers are installed, it is possible to configure the iMetOS to communicate with the hardware.

2.6.1 Determining the COM Port

To determine the COM port used by the iMet-3150, follow these steps for Windows XP:

a. Go to the Start Menu | Control Panel.

b. Open System.

c. Select the [Hardware] tab and hit the [Device Manager] button.

d. Expand the Ports (COM & LPT) group.

e. The decoder port will be listed as "USB Serial Port (COM*x*)", not "Bell202Decoder".

To determine the COM port1 used by the iMet-3150, follow these steps for Windows Vista:

f. Go to the Start Menu | Settings.

g. Open the Device Manager.

h. Expand the Ports (COM & LPT) group.

i. The decoder port will be listed as "USB Serial Port (COM*x*)", not "Bell202Decoder".

2.6.2 iMetOS Setup

Configure iMetOS as follows:

a. Connect the decoder to the System Computer with the USB cable.

b. Open iMetOS from the desktop icon or from the Start | InterMet Systems | iMetOS menu.

c. Select [Real Flight].

d. The first time the software is run, Windows Firewall may display a security alert, as shown in Figure 2-9. Select [Unblock] to allow iMetOS to function normally.

Windows Security Alert
To help protect your computer, Windows Firewall has blocked some features of this program.
Do you want to keep blocking this program?
Name: iMetOS Met Data Server
Publisher: InterMet Systems, Inc.
Keep Blocking
Unblock
Ask Me Later
Windows Firewall has blocked this program from accepting connections from the Internet or a network. If you recognize the program or trust the publisher, you can unblock it. When should I unblock a program?

Figure 2-9: Windows Firewall Security Alert

e. On the Windows taskbar, right click on the MetServer icon (a mouse-over calls it iMetOS Communications) and select Settings.

f. Remove all devices under the Device and Speed section (by setting them to a blank) except for the "Bell202Decoder 1200".

g. Select "Bell202Decoder 1200" under the Device and Speed section.

h. Select the decoder COM port under the COM port selection. The MetServer will only show the available registered COM ports on the computer.

i. Select [OK] to save the settings.

j. Return to the iMetOS client.

k. Select the IMS – iMet-1-AA or IMS – iMet-1-AB radiosonde type from the radiosonde type

pulldown (see Section 4.4.2.11). The radiosonde model is printed on the frequency selection label on the radiosonde. For the iMet-1-RS, choose the iMet-1-AB.

a. Close iMetOS.

Setup of the iMetOS communication settings is now complete.

2.7 HARDWARE INSTALLATION

The iMet-3150 is designed as a completely portable system. No part of the system is designed to be permanently mounted, so there are no specific installation instructions. The only instructions are for connecting all of the hardware and preparing the Icom IC-R20 receiver.

The Icom IC-R20 receiver comes with the following hardware, as shown in Figure 2-10.

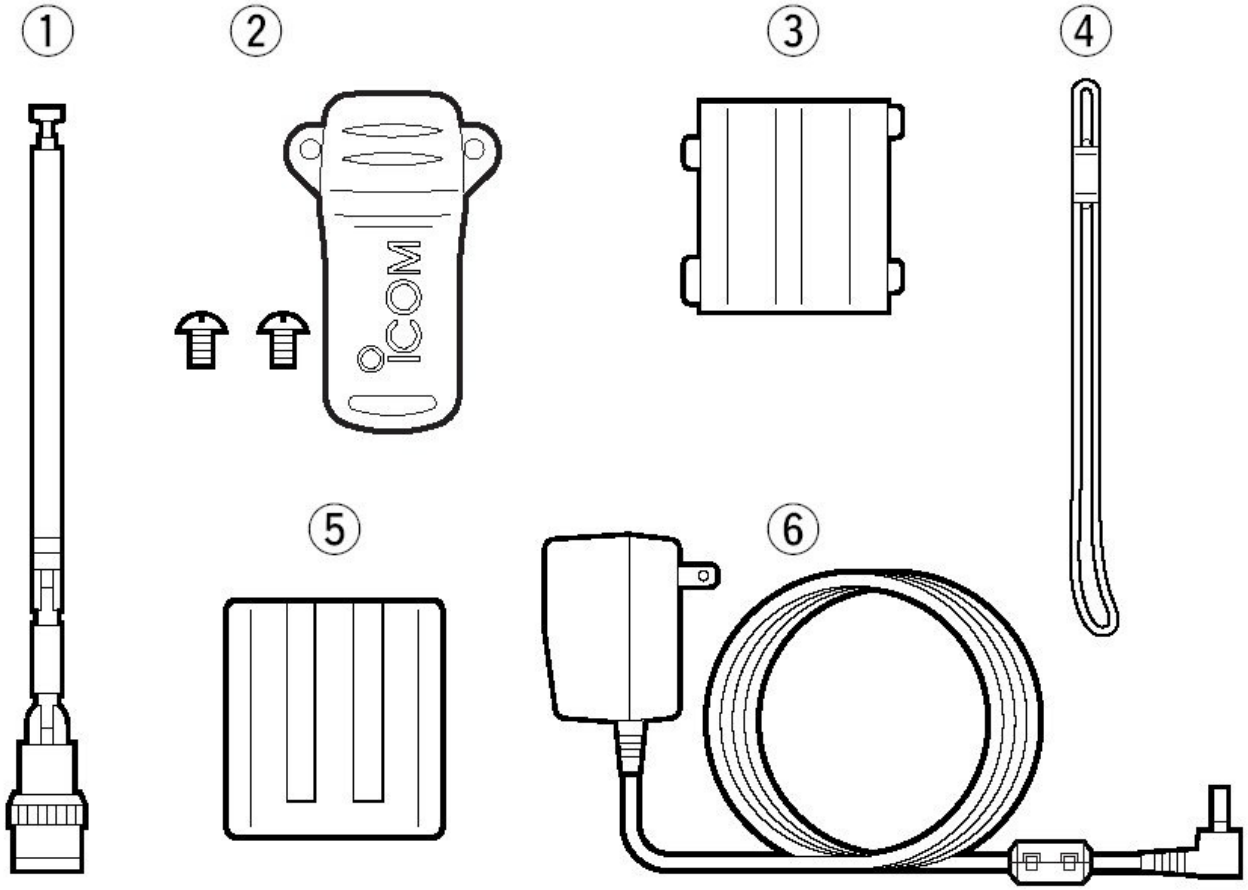


Figure 2-10: Icom IC-R20 Supplied Accessories

Table 2-3: Parts Required for Use

✓	Item	Description
	1	Antenna
	2	Belt Clip
	3	AA Battery Spacer

✓	Item	Description
	4	Hand Strap
	5	Li-Ion Battery Pack
	6	AC Adaptor

The Icom IC-R20 may be powered by the Li-Ion battery pack, three AA alkaline batteries, or by the external AC Adaptor. When using the Li-Ion battery pack, the Icom IC-R20 may operate up to 11 hours on a single charge. The Li-Ion battery pack is charged in the receiver when the external AC Adaptor is connected (this takes up to 8 hours).

To set up the iMet-3150, connect the decoder to the System Computer using the supplied USB cable. Connect the decoder to the Icom IC-R20 SP/CI-V output using the audio cable supplied. See Figure 2-11 for a diagram.

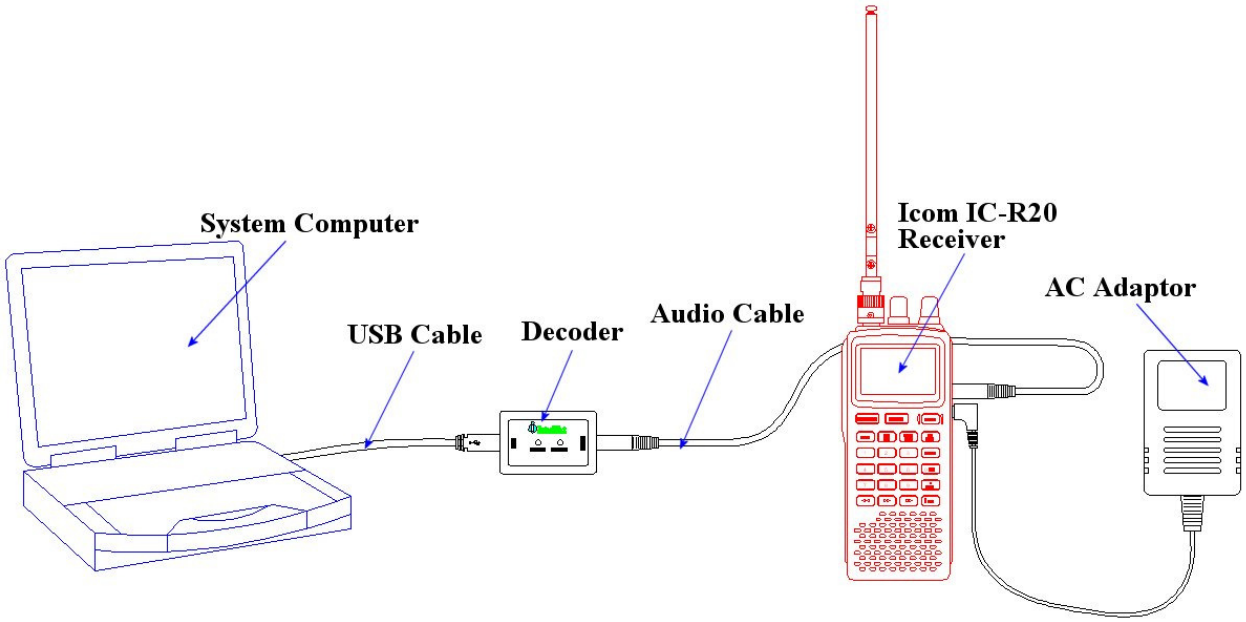


Figure 2-11: iMet-3150 and System Computer

CHAPTER 3
FLIGHT OPERATIONS

3.1 LAUNCH SEQUENCE

PreFlight operations must be performed before a flight can be successfully launched.

1. Connect the Icom IC-R20, the decoder, and the system computer with the audio cable and USB cable. If the decoder drivers have not yet been installed, refer to Section 2.4 - Driver Installation and Section 2.5 - Disabling Serial Mouse Detection.
2. Start the iMetOS software.
3. Activate the iMet-1 radiosonde
4. Activate the Icom IC-R20 and tune to the radiosonde
5. Inflate the met balloon and prepare the flight train
6. Complete the pre-flight baseline data entry and radiosonde check
7. Confirm operational status of all systems and release the balloon

An experienced operator or team can quickly complete these steps, with multiple activities taking place simultaneously.

3.1.1 Connect the Icom IC-R20, Bell202 Decoder, and System Computer

If this is the first time connecting the Bell202 Decoder, follow the procedures in Section 2.4 - Driver Installation and Section 2.5 - Disabling Serial Mouse Detection prior to proceeding.

Connect the decoder to the System Computer using the supplied USB cable. Connect the decoder to the Icom IC-R20 SP/CI-V output using the audio cable supplied. See Figure 3-1 for a diagram.

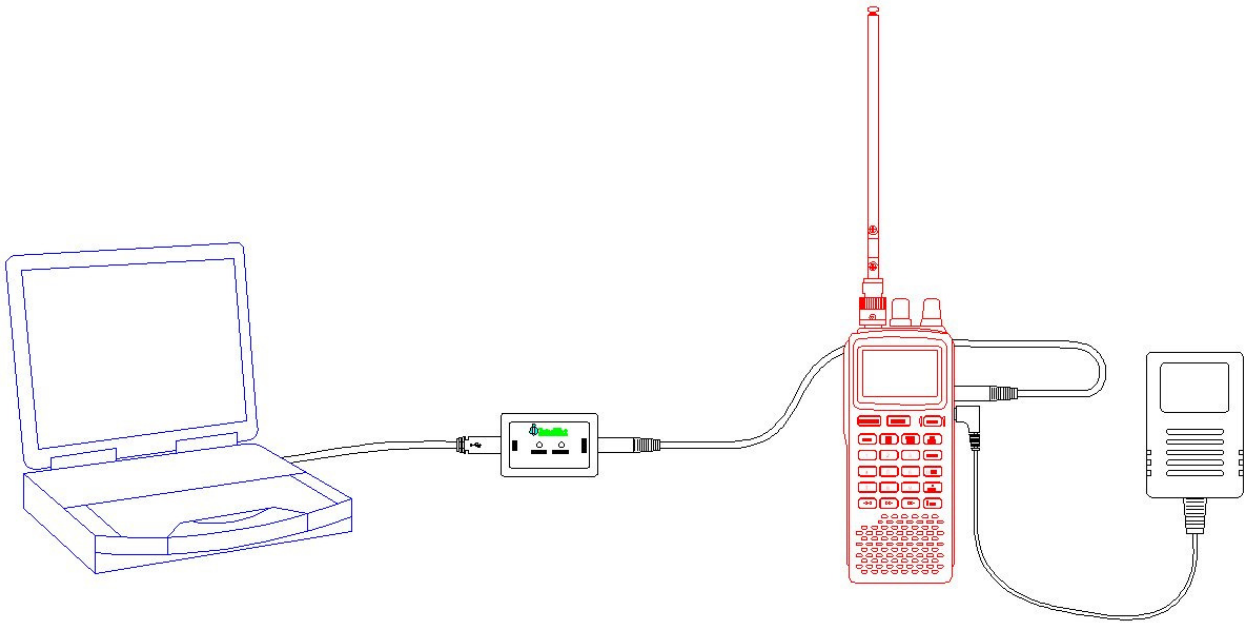


Figure 3-1: iMet-3150 and System Computer

3.1.2 Starting the iMetOS Software

If this is the first time using the iMetOS software, please ensure that the iMetOS has been set up in accordance with Section 7.2.1, Installing iMetOS for the First Time.

Once the System Computer is on, initialize iMetOS using the desktop icon. The opening screen is a pane superimposed on the main Flight Screen (Figure 3-2)

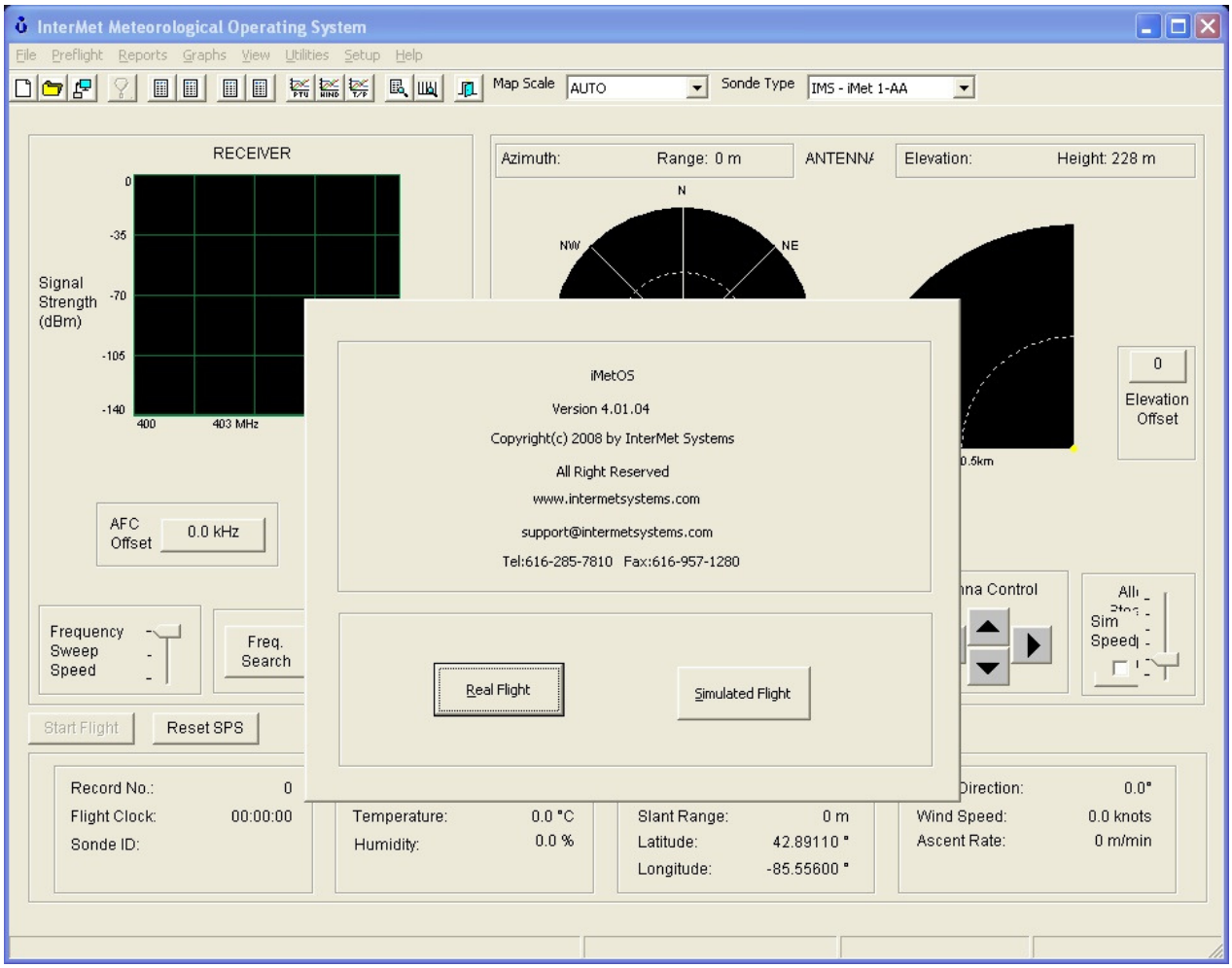


Figure 3-2: Opening Screen

The opening screen pane shows the following two options:

1. Real Flight
2. Simulated Flight

Open iMetOS as a [Real Flight] and check the radiosonde type. If the radiosonde type needs to be changed, change to the proper type and restart the iMetOS. The radiosonde type is printed on the radiosonde cover.

NOTE

For the iMet-1-RS radiosonde, choose the iMet-1-AB radiosonde type.

Restart the software in the desired operating mode.

3.1.2.1 iMetOS Position Information

The iMetOS must be set up for the iMet-3150's location as follows:

a. Open the General System Parameters Setup window under Setup | System Parameters 1.

b. Input all 0's for the basestation latitude, longitude, and altitude, as shown in Figure 3-3.

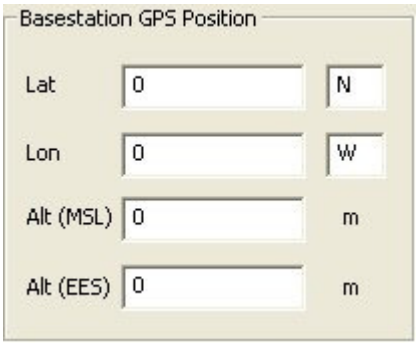


Figure 3-3: Enter 0's for basestation GPS position

c. Turn off differential corrections by unchecking the differential corrections checkbox.

d. Press [OK] to save the values.

NOTE

The radiosonde reports MSL heights from the GPS directly, so no GPS conversion is required.

3.1.3 Scan for an Available Radiosonde Frequency

Perform the following steps to scan for an appropriate frequency (see Figure 3-11 for a layout of the buttons).

Figure 3-4: IC-R20 Control Buttons

a. Turn on the Icom IC-R20 by pressing the [POWER] button.

b. Unplug the audio cable from the IC-R20, if it is plugged in.

c. If the receiver was left in the dual watch mode from any other uses, press and hold the [DUALWATCH] button until only one frequency is displayed. This will be clear if two frequencies are displayed on the IC-R20 display.

d. If the MR icon is not displayed in the right corner, repeatedly press the [MR/S.MW] button until MR*xxx* is displayed, where *xxx* is either a 3 digit number or a letter and a two digit number.

NOTE

As the [MR/S.MW] button is pressed, the receiver will cycle through the memory banks in this order: TV, WX, MR.

e. Once the MR icon is displayed, repeatedly press the [BAND] button until MRB*dd* is displayed, where *dd* is a two digit number.

Figure 3-5: Low signal strength at 405 MHz

f. While paying attention to the displayed signal strength, use the right dial on top of the IC-R20 to change the tuned frequency. Scan the four radiosonde frequencies and identify which frequency has the lowest signal strength (lowest amount of interference). Use this frequency when preparing the radiosonde.

NOTE

MRB00, MRB01, MRB02, and MRB03 are preprogrammed with the most common frequencies for the radiosonde (it is not usually exactly 402, 403, 404, or 405 MHz).

3.1.4 Activate the iMet-1 Radiosonde

Activate the iMet-1 radiosonde by performing the following steps:

a. Remove the contents from the shipping bag.

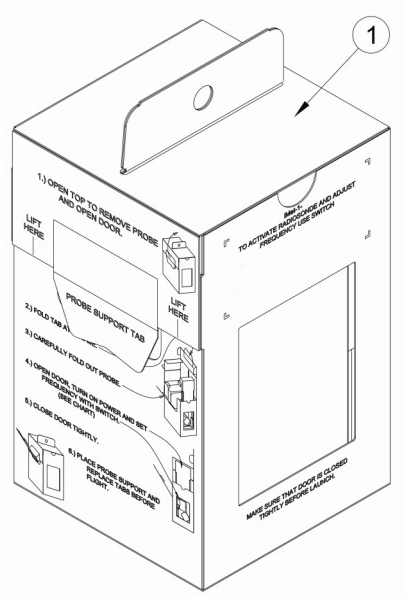


Figure 3-6: Remove radiosonde from the shipping bag

b. Open the Top Flap (1) and deploy the Temperature/Humidity Probe (2).

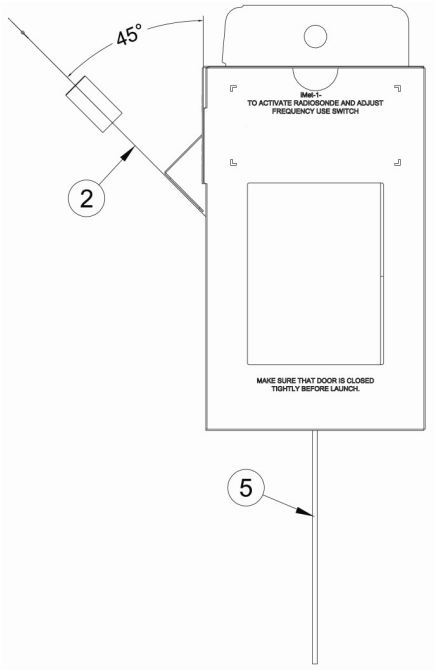


Figure 3-7: Extend the temperature/humidity probe

c. Bend the Temperature/Humidity Probe (2) to approximately a 45° angle.

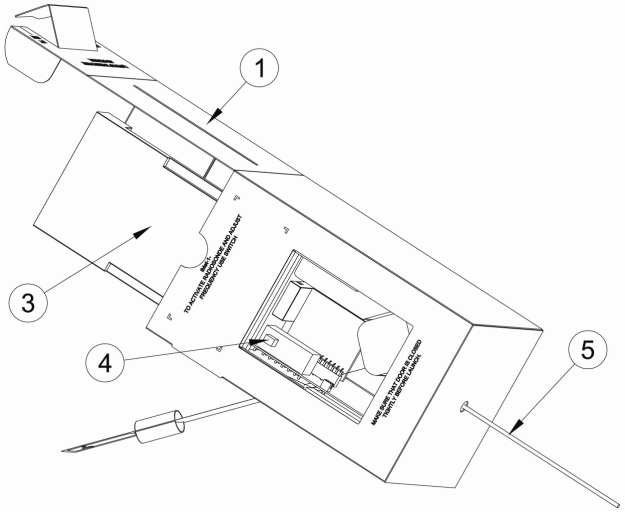


Figure 3-8: Radiosonde Open

d. Slide back the Access Cover (3) and connect the radiosonde's battery to the radiosonde mainboard.

NOTE

If the temperature has been near (approximately 3°C or 38°F) or below freezing, it is advisable to warm the battery first by placing it in a warmer location or in pants pockets.

NOTE

The two sockets in the connector can be seen when the connector is orientated properly. The red wire will be above the black wire.

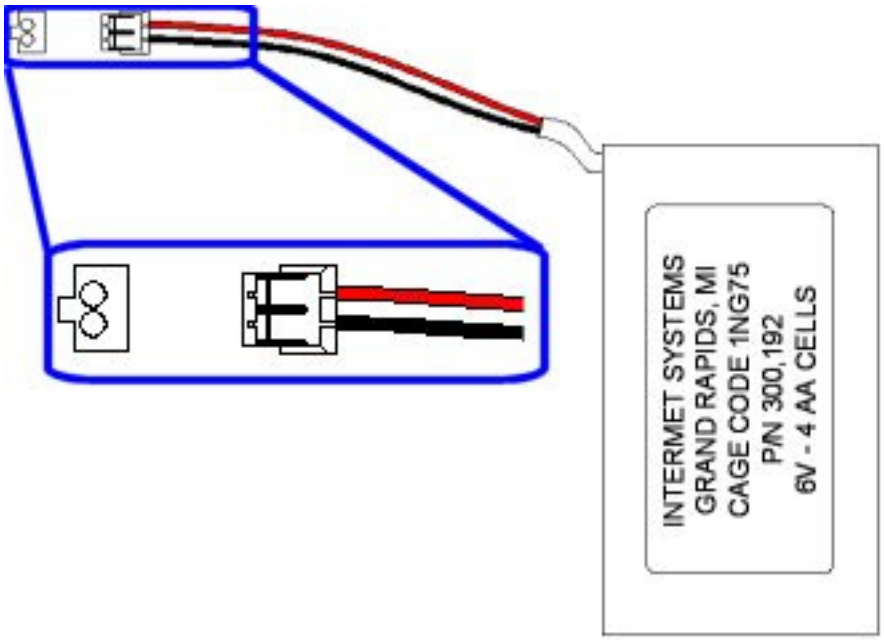


Figure 3-9: Battery Connector

e. Turn on the radiosonde to the frequency with the lowest amount of interference (found in Section 3.1.3 Step f). Set the frequency switch (4) according to the Transmit Frequency information on the radiosonde Sleeve. Replace the Access Cover (3).

f. Fold the probe support tab back (on the Top Flap) and close Top Flap (1).

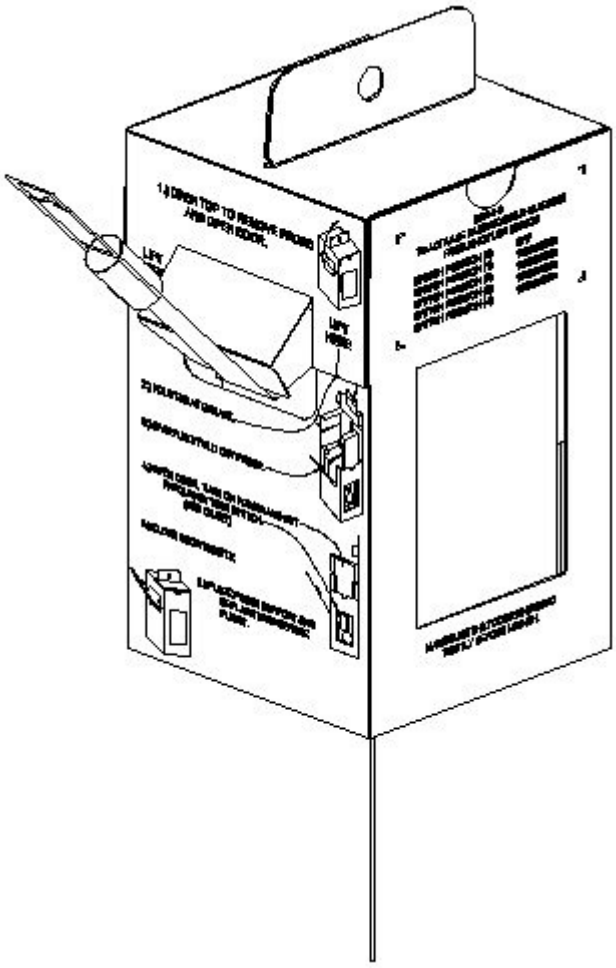


Figure 3-10: Radiosonde Prepped for Flight

Once power is activated, the radiosonde will initialize and begin to search for GPS satellites. The GPS search requires a view of the sky

Status of the GPS acquisition can be monitored on the GPS Data Window on iMetOS (see Figure 4-2) once the receiver is tuned to the radiosonde (see Section 3.1.5).

3.1.5 Icom IC-R20 Receiver

Perform the following steps to continue preparing the receiver for flight (see Figure 3-11 for a layout of the buttons).

Figure 3-11: IC-R20 Control Buttons

At this point, there are two different methods for tuning the Icom receiver (by pre-programmed memory in Section 3.1.5.1, or by hand in Section 3.1.5.2). Using pre-programmed memory is preferred.

3.1.5.1 Tuning the receiver using pre-programmed memory

a. If the MR icon is not displayed in the right corner, repeatedly press the [MR/S.MW] button until MR*xxx* is displayed, where *xxx* is either a 3 digit number or a letter and a two digit number.

NOTE

As the [MR/S.MW] button is pressed, the receiver will cycle through the memory banks in this order: TV, WX, MR.

b. Once the MR icon is displayed, repeatedly press the [BAND] button until MRB*dd* is displayed, where *dd* is a two digit number.

c. Use the right dial on top of the IC-R20 to change the memory record until the appropriate frequency is displayed.

NOTE

MRB00, MRB01, MRB02, and MRB03 are preprogrammed with the most common frequencies for the radiosonde (it is not usually exactly 402, 403, 404, or 405 MHz).

d. Press and hold the [0/AFC] button until AFC is displayed in the upper right hand corner.

e. Press and hold the [►►/RF GAIN] button until `SET RF GAIN:`*`xxx`* is displayed on the bottom of the screen.

f. Use the right dial on top of the IC-R20 to adjust the RF gain to MAX. Press the [►►/RF GAIN] button to save the setting.

g. Adjust the volume control with the left dial on top of the IC-R20 or the up [▲] or down [▼] buttons on the left side as desired. The radiosonde transmission should now be heard on the receiver's speaker.

h. Plug in the audio cable. The radiosonde transmission should no longer be heard on the speaker.

i. Adjust the volume control with the left dial or the up [▲] or down [▼] buttons on the left side such that it is around 75% volume.

NOTE

Adjusting the volume to 75% is VERY important to ensure the decoder will function properly. If this step is not performed, there is a chance that radiosonde data will be lost late in balloon flights.

j. Set the squelch to the open setting by pressing and holding the [SQL] button on the left hand side while turning the right dial on top of the IC-R20 counter-clockwise until "SQUELCH:OPEN" is displayed on the screen.

k. Fully extend the IC-R20 antenna and place it in an orientation as close to vertical as possible.

Tuning of the IC-R20 receiver is complete. A sample display for a radiosonde setting of 405 MHz is given in Figure 3-13. Continue with Section 3.1.6.

Figure 3-12: IC-R20 tuned to a radiosonde at 405.025 MHz

3.1.5.2 Tuning the receiver by hand

a. Repeatedly press the BAND button on the IC-R20 until the display reads "MODE WFM".

b. Press the [VFO/MHz] button the IC-R20 to put the receiver into a frequency control mode.

c. Type radiosonde transmission frequency into the IC-R20 as *fff*.025, where *fff* is either 402, 403, 404, or 405 (depending on the iMet-1 switch position). Press the [VFO/MHz] button to complete the entry.

d. Press and hold the [9/TS] button on the IC-R20 until `SET TS: xx kHz` is displayed on the bottom of the screen.

e. Use the right dial on top of the IC-R20 to adjust the tuning step to 20.0 kHz. Press the [9] button to save the setting.

f. Press and hold the [0/AFC] button until AFC is displayed in the upper right hand corner.

g. Press and hold the [►►/RF GAIN] button until `SET RF GAIN:xxx` is displayed on the bottom of the screen.

h. Use the right dial on top of the IC-R20 to adjust the RF gain to MAX. Press the [►►/RF GAIN] button to save the setting.

i. Adjust the volume control with the left dial on top of the IC-R20 or the up [▲] or down [▼] buttons on the left side as desired. The radiosonde transmission should now be heard on the receiver's speaker.

j. Plug in the audio cable. The radiosonde transmission should no longer be heard on the speaker.

k. Adjust the volume control with the left dial or the up [▲] or down [▼] buttons on the left side such that it is around 75% volume.

NOTE

Adjusting the volume to 75% is VERY important to ensure the decoder will function properly. If this step is not performed, there is a chance that radiosonde data will be lost late in balloon flights.

l. Set the squelch to the open setting by pressing and holding the [SQL] button on the left hand side while turning the right dial on top of the IC-R20 counter-clockwise until "SQUELCH:OPEN" is displayed on the screen.

m. Fully extend the IC-R20 antenna and place it in an orientation as close to vertical as possible.

Tuning of the IC-R20 receiver is complete. A sample display for a radiosonde setting of 405 MHz is given in Figure 3-13. Continue with Section 3.1.6.

Figure 3-13: IC-R20 tuned to a radiosonde at 405.025 MHz

3.1.6 Prepare the Balloon and Flight Train

Before starting to inflate the balloon, verify its specifications (weight, rate of ascent, burst altitude, diameter on ground and at burst point, payload, and free lift). In general, balloons weighing 300 g are capable of ascent to about 22 kilometers; balloons weighing 800 g and higher are capable of ascents to 30 kilometers and above.

WARNING

Do not use hydrogen in proximity to fire, sparks, cigarettes, etc! Do not use hydrogen in enclosed areas!

Inflate the balloon. Assemble the radiosonde flight train according to the procedure defined for your site. Table 3-1 defines the different configurations of the flight that can be used.

Table 3-1: Flight Train Order

Flight Train Order	Full Normal Train	Full Alternate Train	Minimal	Minimal
1	Balloon	Balloon	Balloon	Balloon
2	Parachute	Parachute	30 m (100 ft) String	De-Reeler
3	30 m (100 ft) String	De-Reeler	Radiosonde	Radiosonde
4	Radiosonde	Radiosonde	-	-

Today's radiosonde sensors are sensitive enough to be effected by the balloon's wake. This is the reason why 30 m (100 ft) of string is used between the balloon and radiosonde. The iMetOS also relies on this distance, as this effects the period of the pendulum motion. The iMetOS uses filters to remove the pendulum motion from the radiosonde GPS data, allowing for true wind speed and direction.

InterMet Systems makes a de-reeler, which is fully compatible with the iMet-1 radiosonde family. The de-reeler is useful in making weather balloon launches easier, especially in tight areas or in higher winds. The de-reeler contains 30 m (100 ft) of string on a spool. As the weather balloon pulls up, the string unwinds at a rate of 0.2 – 0.5 m/s, depending on payload weight, from the spool until the entire 30 m length of string is extended. This allows the radiosonde to be close to the balloon on launch to clear obstacles, while giving

the full benefit of being 30 m away from the balloon moments after launch to obtain proper PTU and winds. The de-reeler is designed for payloads of 200 – 520 gm.

Table 3-2: De-Reeler Specs

Specification	Value
String Length	30 m ± 0.5 m
Payload Weight	200 – 520 gm
String Breaking Force	> 20 lb (9 kg) < 50 lb (23 kg)
Deployment Rate	0.2 – 0.5 m/s
Weight	44 gm

The de-reeler is attached to the balloon/parachute and radiosonde with a tie-wrap. The string is wrapped around a core, using a rubber flap to slow down the payout rate of the string. To use the de-reeler, perform the following:

a. Remove the de-reeler from the shipping bag.

b. Set aside the unattached tie-wrap. It is only a spare and will not be used.

c. Using the tie-wrap on top, attach the de-reeler to the parachute or balloon. Be sure to rotate the tie-wrap such that the excess tie-wrap does not interfere with the string, as shown in Figure 3-14.

d. Carefully remove the loose end of the string from the slit at the top of the de-reeler.

e. Unwind a short section of string and use the bottom tie-wrap to attach the radiosonde.

f. Ensure the rubber flap is extended downward.

The de-reeler is now ready for flight. When releasing the balloon and radiosonde, release the radiosonde as soon as a slight tug is felt.

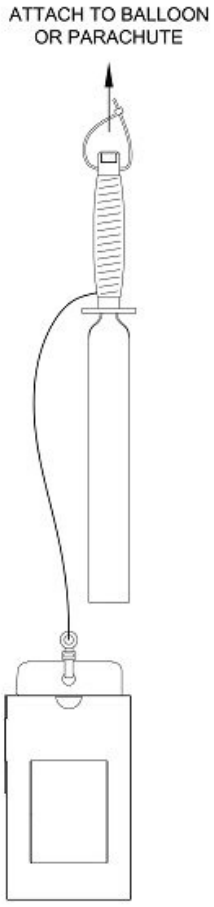


Figure 3-14: InterMet De-Reeler, part number 300,212

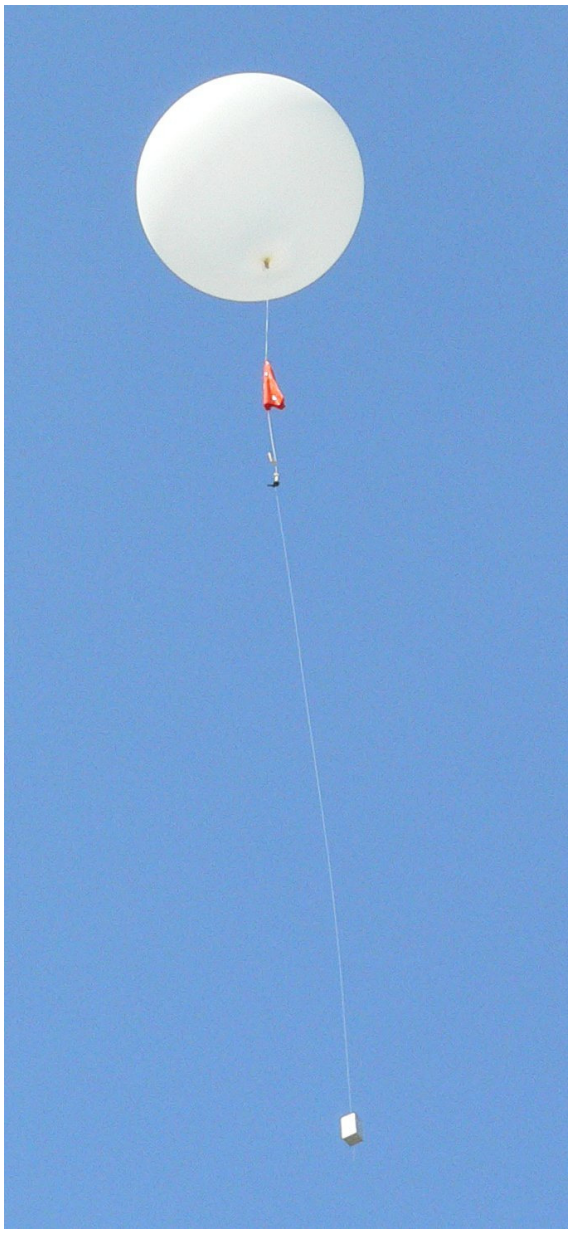


Figure 3-15: Flight Train, with balloon, parachute, de-reeler, and radiosonde

3.1.7 PreFlight Data Entry and Radiosonde Status Check

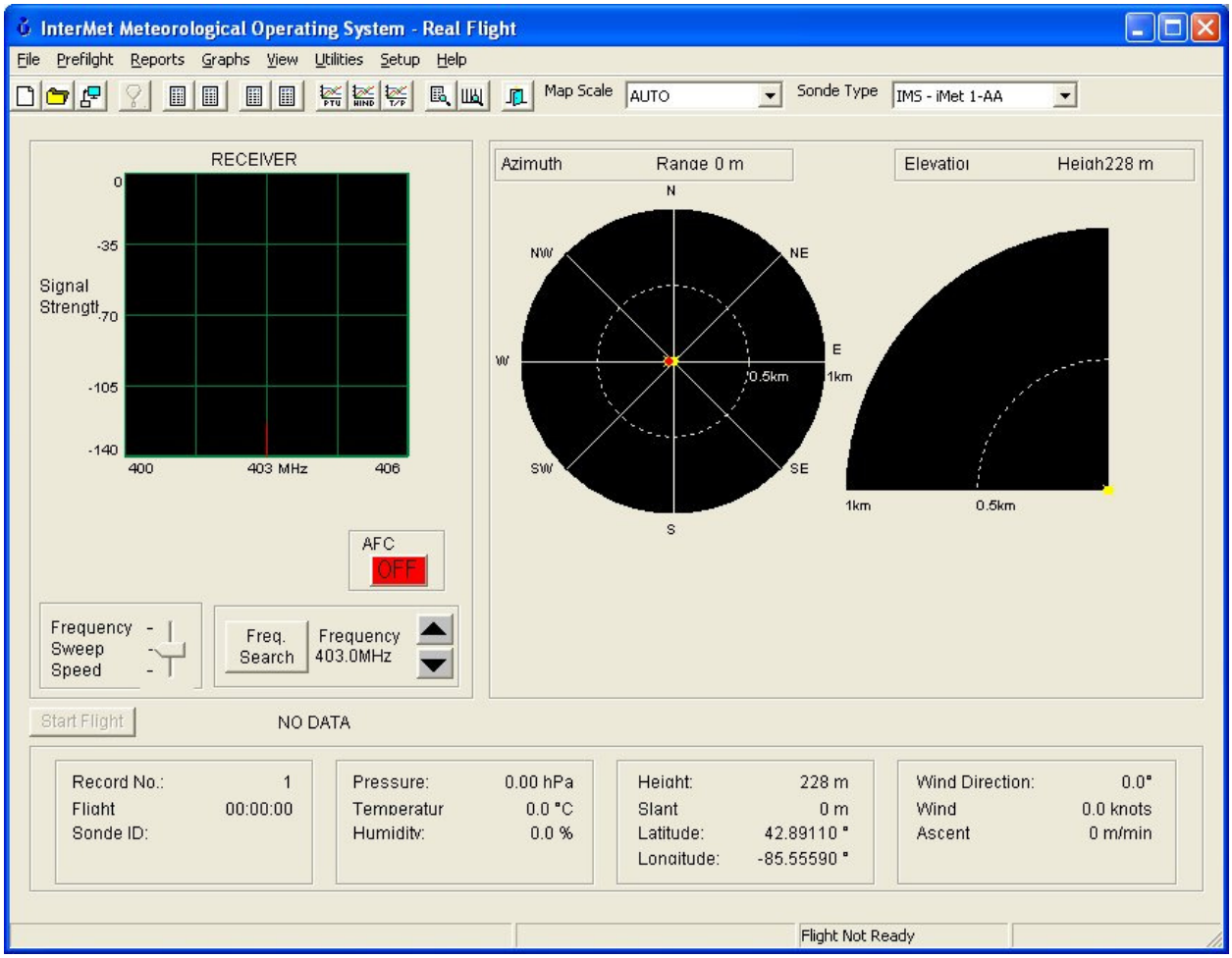


Figure 3-16: Main Flight Screen

If no signal is indicated on the Receiver frame and no PTU readings appear, this may indicate that there is a problem with the radiosonde or the receiver settings. Verify that the sonde is on and the receiver is properly tuned. When the receiver is correctly tuned, there will be no arrow indication on the receiver for the AFC setting.

3.1.7.1 Radiosonde GPS

If the radiosonde does not include its own pressure sensor (iMet-1-AA or iMet-1-BA), it is important to verify that the radiosonde is reporting a GPS position with altitude prior to beginning PreFlight. Open the View | View GPS Information window to confirm that the radiosonde is reporting a GPS position and an altitude that is reasonable.

NOTE

The iMet-1 radiosonde does not report the satellites that are being used. To verify sonde GPS, look for radiosonde latitude, longitude, altitude, and an occasional change for north, east, and vertical velocity.

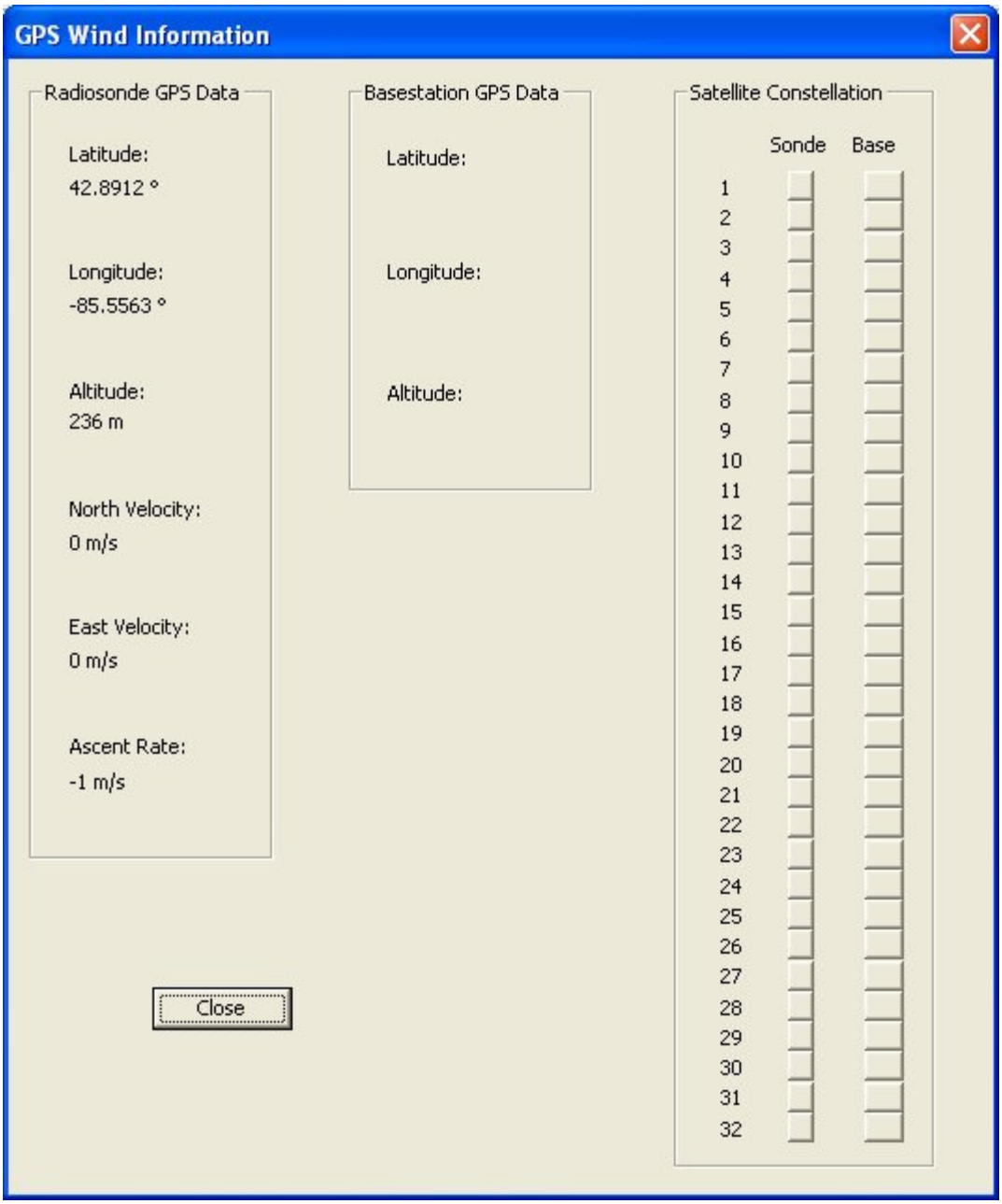


Figure 3-17: Sonde GPS

3.1.7.2 PreFlight Data Entry

To initialize the flight data record, select *New* from the File menu on the Flight Screen menu bar, or from the Flight Screen toolbar. This will bring up the PreFlight data entry screen (Figure 3-18).

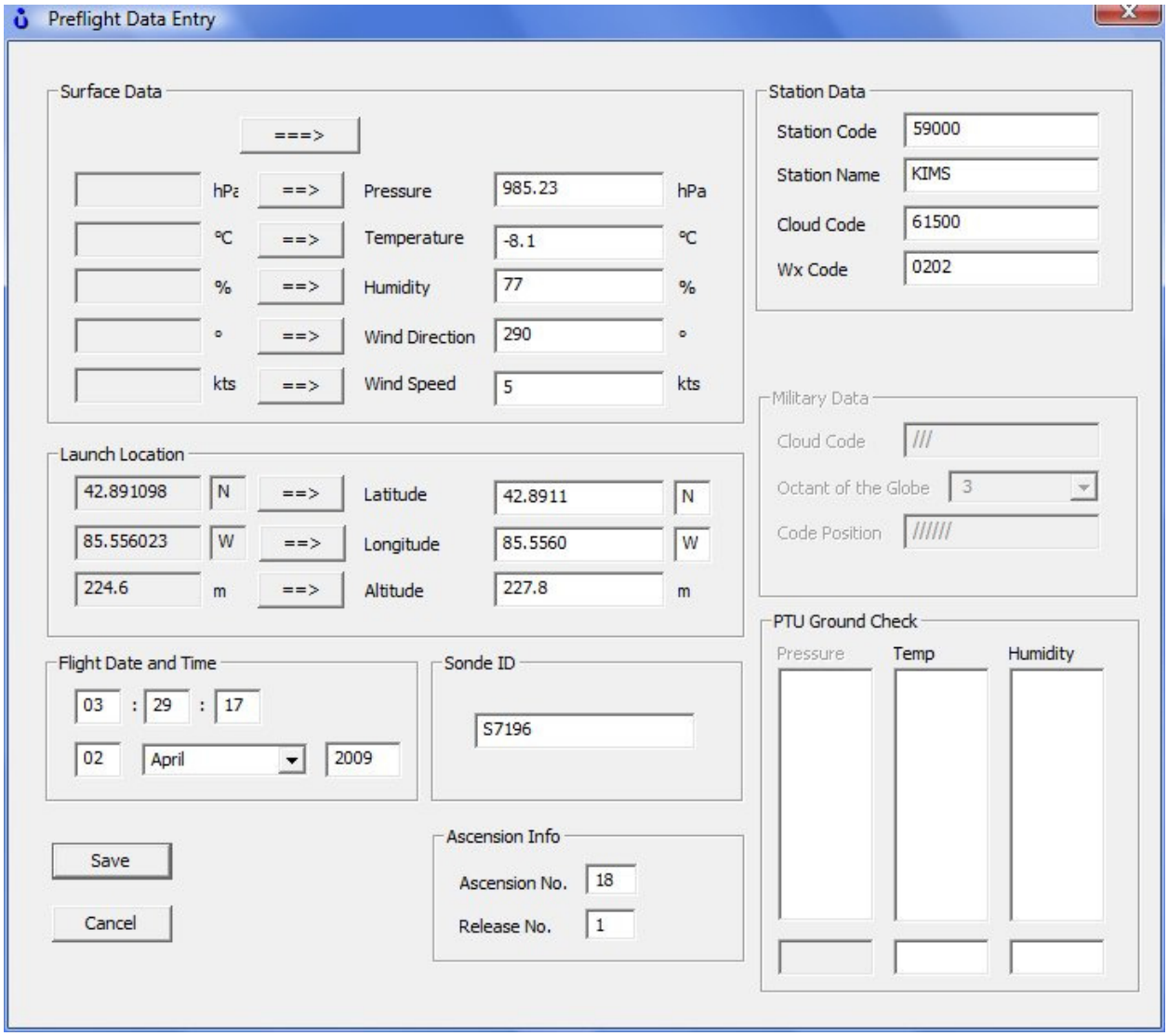


Figure 3-18: PreFlight Data Entry

PreFlight data entry is required for a baseline reference. To establish this baseline, meteorological data is entered into the Surface Data frame of the PreFlight Data Entry window. To accept the radiosonde position data as the preflight position, click the small [==>] buttons to accept individual values. All other values should be entered manually in the right column of the Surface Data frame.

NOTE

The Altitude value should be the MSL height of the reference barometer as accurately as possible.

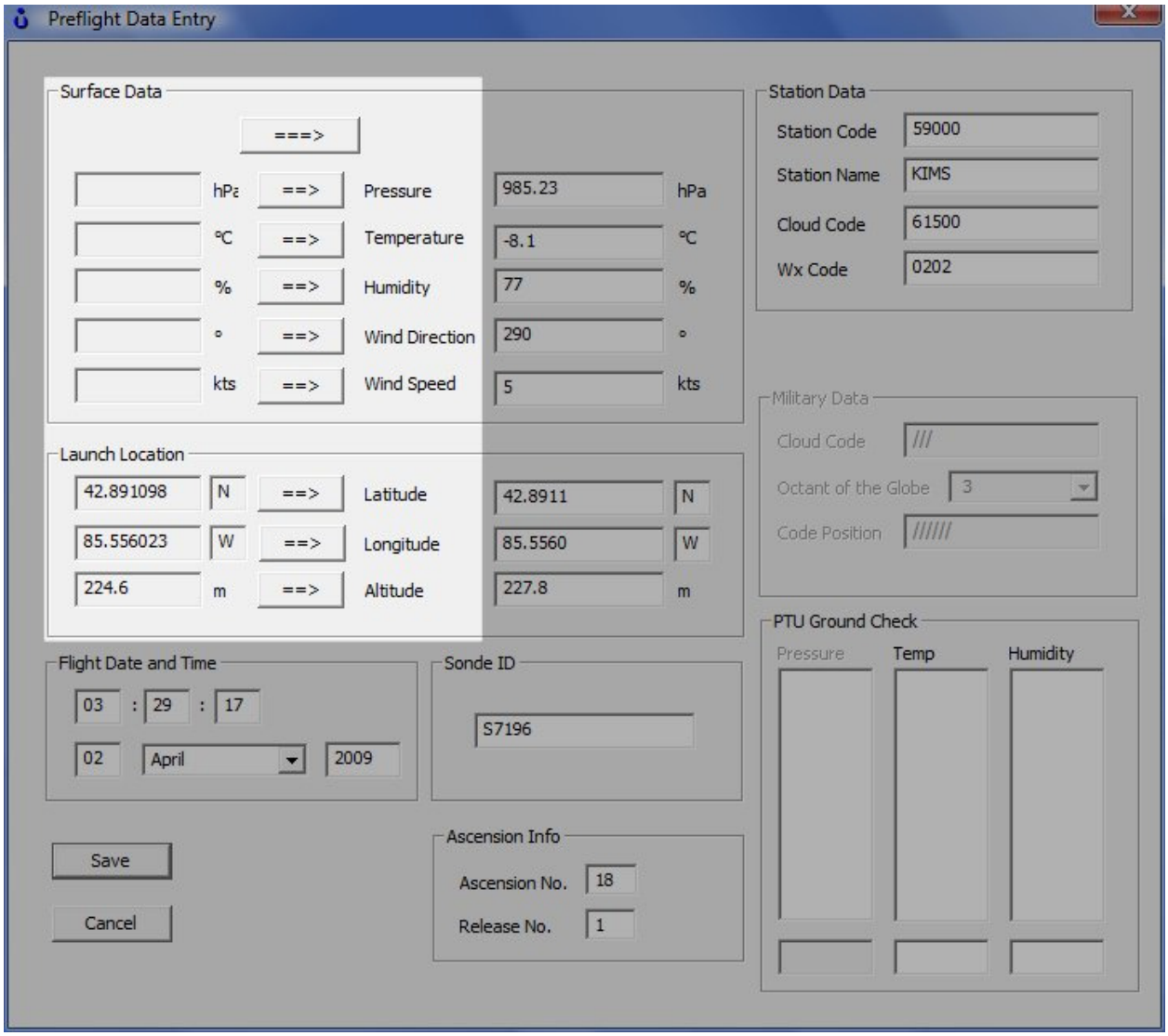


Figure 3-19: ASOS Surface Data Area

If the system is not integrated with an ASOS, enter the baseline data manually in the right column of the Surface Data frame. Baseline data can be obtained from any calibrated sensor, including hand-held units.

Latitude, Longitude and Elevation will be entered automatically by pushing the [==>] button from GPS data received from the radiosonde. This position is used as the "launch position", or the point from where all reports are based (centered).

NOTE

If no accurate external measuring devices are available (ASOS, fixed or hand-held), the PTU data from the radiosonde may be used, appearing on the Flight Screen, as surface data. If sonde data is used, be sure the sonde is set outside in a suitable location to gather accurate temperature and humidity.

Surface data must be entered for the PreFlight process to be completed. Station Data and Military Data are

not required parameters but should be used when required by the sounding mission profile. Flight Date and Time are entered automatically from the system PC.

NOTE

In the event of a launch delay, the user may update the preflight data prior to launch from the Preflight menu.

3.1.7.3 Radiosonde Status Check

The iMet-1 radiosonde does not require recalibration prior to launch. If using an InterMet radiosonde that includes an internal pressure sensor (iMet-1-AB), it is desirable to use a calibrated barometer to apply a pressure correction prior to releasing the sonde. This correction is made automatically during the pre-flight data entry. In this case, the radiosonde should be placed at the same height of the barometer so as not to introduce a pressure error.

NOTE

At ground level, a 10 meter vertical difference between the location or the reference pressure sensor and the radiosonde can result in an error of approximately 1 mb. If the sonde is not physically located at the same altitude as the reference sensor, a height compensation factor must be included when entering the baseline pressure data.

3.1.7.4 Pre-Flight Status Check

Although the temperature and humidity sensors do not need to be recalibrated, it is necessary to verify before the flight that they have not been damaged or contaminated during storage.

After Surface Data has been entered, the PTU Ground Check frame (Figure 3-19) can be used to verify that the sonde's output is within specifications. Each column contains the most recent readings for sonde Pressure, Temperature and Humidity. The data field at the bottom of each column calculates the difference between the most recent sonde reading and the Surface Data. If the absolute value of these differences is larger then 5 mb for pressure, 2º C for temperature, and 10% RH for humidity it is possible that the sonde sensors have been damaged or corrupted.

If the sonde PTU is outside of allowable tolerances, check first to be sure the sonde is in close proximity to the sensors used for the PreFlight Baseline. If the sonde PTU is still outside of allowable tolerances, verify that the reference sensors are calibrated and reliable. If the sonde is acceptable, press [Save] on the pre-flight screen and proceed to the Baseline Data Check (3.1.7.8)

If confident that the sonde is being accurately measured against reliable sensors and is still outside of acceptable tolerances, return the sonde to the manufacturer for replacement (see CHAPTER 10) and select a new sonde. Repeat the PreFlight process by closing iMetOS and restarting the software for a Real Flight.

3.1.7.5 Ascension Info

iMetOS uses an ascension number format for all data files. The files are named *aaa_rrr*, where *aaa* is the ascension number (with leading 0's) and *rrr* is the release number (with leading 0's). Allowable ascension numbers are 0-999, while allowable release numbers are 0 through 3.

An ascension number is generally considered the number of the flight for the year. If two flights are normally flown a day, then the ascension number on the 35th day (February 4) for the 2nd flight would probably be 70.

The release number is generally considered the number of times the flight for that hour has been tried to be released. The first release would have a release number of 1, while a 2nd try would be 2.

Using 0 for the ascension number or release number generally indicates that the flight is an informal test.

3.1.7.6 Station Data

Station Data includes the following data items:

- Station Code: The four letter code for the station. This parameter is used in certain WMO messages.

NOTE

If the user has selected MOBILE or SHIP for the Station Type in the WMO Coding Parameters I (see section 6.8), use the Station Code for part D…D of the TEMP message. Part D…D of the TEMP message is identified as the ship's call sign or an alphanumeric code that contains a two letter geographical designator and the first three letters of the name of the town.

- Station Name: The WMO five digit code for the station. This parameter is used in certain WMO messages.
- Target No.: Target ascent number. This is generally 0. Increment if this is a second attempt to perform a flight.
- Cloud Code: The five-digit WMO Cloud Code used in certain WMO messages.
- Wx Code: The four-digit WMO Weather Code used in certain WMO messages.

3.1.7.7 Military Data

Military Data includes the following data items:

- Cloud Code: Used in the STANAG Standard Target Acquisition message
- Octant of the Globe – Only relevant in certain STANAG reports and can be changed at any time through the Setup | Military Coding Parameters window. This field is otherwise automatically computed by the iMetOS to match with the latitude and longitude of the station.
- Code Position: A six-digit code used in the STANAG reports, but only in the Computer (METCM) report when Octant 9 is selected for Octant of the Globe

There are no provisions to input Cloud Code, Wx Code, or Military Data automatically from an ASOS. These must be filled in by the operator.

NOTE

Military Cloud Code, Military Code Position, and Octant of the Globe may be entered either in the pre-flight window, or any time during or after the flight in the Military Coding Parameters window under the Setup menu (see Figure 6-9).

NOTE

If UTM coordinates are selected for the station location instead of Latitude/Longitude under the View menu, "Station Longitude" and "Station Latitude" will be replaced by "Easting" and "Northing" respectively. To use UTM coordinates instead of Latitude and Longitude

Coordinates in the STANAG Computer (METCM) report, choose 9 as the Octant of the Globe.

Date and time appearing on preflight data entry screen are taken from the basestation's GPS time. It is important that the time zone settings are set correctly through Microsoft Windows Date/Time properties.

3.1.7.8 Baseline Data Check

iMetOS includes checks to ensure that all Surface Data is complete and within acceptable ranges. After baseline data has been entered, iMetOS will check the values before the record is saved.

If screen displays the message "Error, incomplete entry!" when [Save] is pressed, one or more of the preflight data items were skipped; pressing [OK] on the error message will center the cursor on the first incomplete entry.

If the screen shows "Error, entry out of range!" when Save is pressed, one or more preflight data items were completed with a value out of range (e.g. wind direction 370°); pressing [OK] on this error message will center the cursor on first erroneous entry. When all entries requiring completion or correction have been corrected, press [Save] once more.

3.1.7.9 Save PreFlight Data

When all baseline data is complete and correct, click [Save]. The text Flight Ready will appear in the bottom status bar.

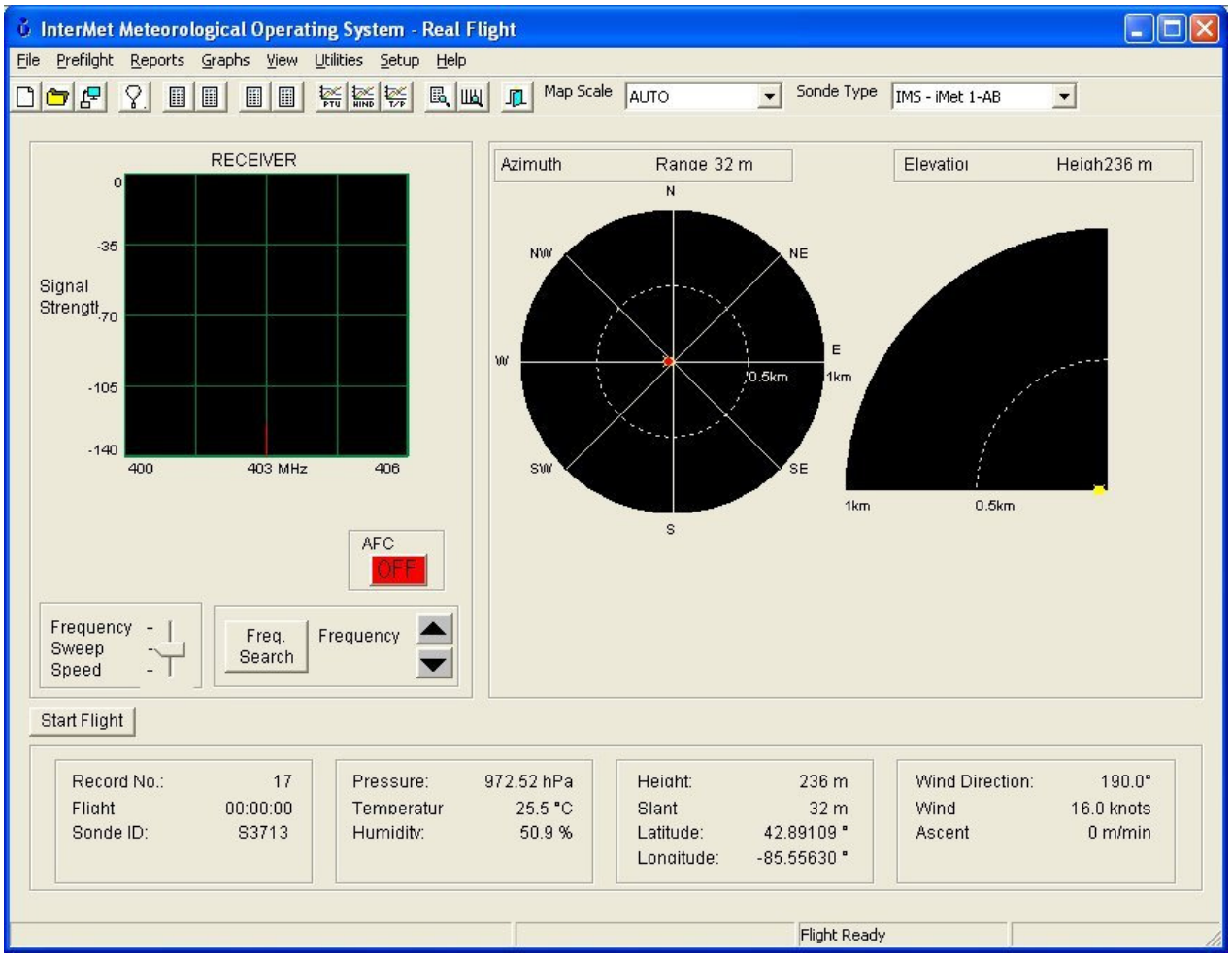


Figure 3-20: Flight Ready

3.1.7.10 Radiosonde Launch Delays

If radiosonde launch has been delayed and there is reason to believe that surface data have changed significantly following preflight data entry, new preflight data may be entered prior to balloon launch. Simply hit [F5] to re-open PreFlight or go to the PreFlight | PreFlight menu to update the data.

3.1.7.11 Radiosonde Ready for Launch

When the radiosonde is ready for launch, the status bar indicates Flight Ready. It is recommended that at least thirty (30) records be received to be sure that the radiosonde is transmitting data consistently before releasing the balloon.

Prior to release, open the View | View GPS Information window to confirm that the radiosonde is reporting a GPS position and an altitude that is reasonable.

NOTE

The iMet-1 radiosonde does not report the satellites that are being used. To verify sonde GPS, look for radiosonde latitude, longitude, altitude, and an occasional change for north, east, and vertical velocity.

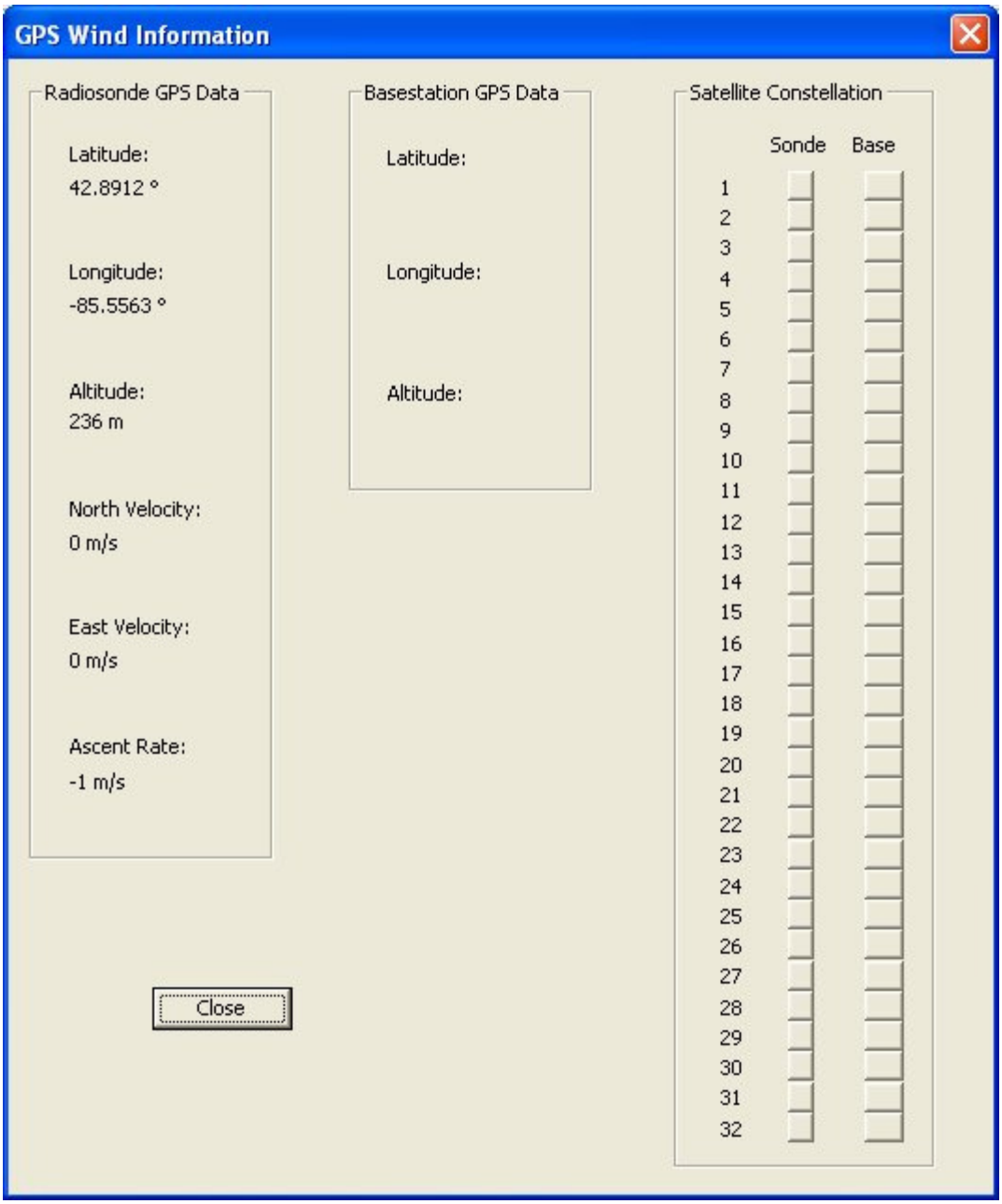


Figure 3-21: Sonde GPS

Once the sonde is in the air, there will be a slight delay until the flight clock starts. The message in the bottom status bar will be replaced by the text FLIGHT IN PROGRESS. Upon sonde release, altitude, ascent rate and PTU values displayed on screen will begin to change rapidly. Wind data and slant range will appear on screen after about four minutes into the flight.

3.1.8 Launching the Radiosonde

The 403 MHz Antenna is an omni-directional antenna. There are no restrictions for minimum launch distance between the sonde and the 403 MHz antenna. The radiosonde can be launched from directly next to the antenna as long as precautions are taken to not allow the radiosonde, string, or balloon to contact the antenna or become entangled.

The radiosonde shall be held such that the body does not block the reception of GPS signals. Hold the radiosonde midway up the side of the radiosonde case.

CAUTION

When handling the radiosonde, take care not to damage the sensor probe.

A typical launch procedure is given below. Precise instructions will be determined as part of the sounding mission profile.

a. Carry the radiosonde train to the launch position.

b. Double-check that the radiosonde is transmitting PTU data (the record number continues to increase) **and** GPS data (View | View GPS Information window).

c. Verify that the iMetOS status bar indicates "Flight Ready".

d. Release the balloon.

e. Release the radiosonde as soon as the balloon tries to pull the radiosonde up.

3.1.8.1 Starting the Flight Clock

iMetOS does not require the [Start Flight] button to be pushed for a Real Flight. Pushing the [Start Flight] button will have no effect. iMetOS includes automatic launch detect, which will automatically start the flight processing after the flight has been launched.

Launch detect will not occur immediately after launch, but generally occurs within one minute of launch. Once iMetOS recognizes that the sonde is in flight, it will back process the data until the actual point of launch is found. The actual point of launch will be flight time of 0:00.

3.1.8.2 Tracking the Radiosonde

During the flight the system will automatically track the radiosonde and record the flight data received from the radiosonde.

3.1.8.3 In Flight Messages

If the sonde signal is lost or not decodable at any point during flight NO DATA or STILL NO DATA warnings will appear on the screen and the record display will stop updating. When the iMetOS receives decodable data again, warning messages will disappear and the record display will resume. These warnings are not uncommon and will occur more often when the signal strength is low. As a rule of thumb, when there is ample signal strength (above -100 dBm), a small number of NO DATA warnings (three or fewer per minute) should be ignored. If substantially more NO DATA warnings occur it may indicate a problem with the radiosonde or receiver.

iMetOS automatically checks the PTU data and warnings will be displayed if the PTU or GPS values appear to be invalid. If these messages are repeatedly sent during a flight, it most likely indicates the failure of a radiosonde sensor. If this happens, it is left to the user to decide whether to re-run the fight with a new sonde or to determine the appropriate procedure for editing the data. The data can be edited via the graphs (during flight or post flight) or through the physical values table (post flight only). See Sections 4.5.2.1and 4.5.4.1 for data editing procedures.

Figure 3-22: Signal too weak for AFC

It is possible as the signal strength becomes weak that the receiver becomes confused by other signals in the area. This will be evident by a constant arrow being displayed under AFC. In this case, it is desirable to turn off AFC. Press and hold the [0/AFC] button on the receiver until AFC disappears from the upper right hand corner.

NOTE

The iMet-1 radiosonde transmits data at a rate of one record per second. Moderate amounts of data loss will not prevent a successful flight and should not result in early termination unless something is clearly wrong. Data loss is more likely at the end of a flight or during periods when the sonde is directly overhead.

Data received and processed during a flight may be displayed and/or printed in real time, as graphs, or meteorological messages and reports.

3.1.9 Flight Termination

To complete the flight, the data logging process must be stopped. The iMetOS will automatically display a message at balloon burst unless it is configured to automatically terminate the flight upon balloon burst. (See Section 6.3 for configuration information.) The Terminate Flight message box gives the user the option to terminate the flight immediately or to continue logging while the sonde is descending. However, once a flight has been terminated, the user cannot resume the flight.

If the user decides to continue logging after balloon burst, the user must click the [Stop Flight] button to terminate data logging when the user chooses to end the flight. This button may be activated at any point if it is not desired to log data from launch to balloon burst. Once the flight is terminated, any messages that are programmed to be created at flight termination will be generated.

3.1.9.1 Data Archiving

Archiving allows the user to store flight files in a single, compressed file. A normal two hour flight takes approximately 1.5 megabytes to store when not compressed. A typical archived (compressed) flight consumes 400-500 kilobytes of disk space.

Archive the flight as follows:

a. From the iMetOS menu bar, go to Utilities | Store Files.

b. Change the "To" directory to C:\IMS\iMetOS\Archives.

c. Change the "From" directory to C:\IMS\iMetOS\Flights.

d. Select the flight file name in the "File Name" box.

e. Click [Archive].

f. Click [Cancel] after the Command Prompt window automatically closes.

Once all tasks regarding the flight are complete, the iMetOS may be closed and the flight files may be deleted from the C:\IMS\iMetOS\Flights directory.

CHAPTER 4
IMETOS

4.1 INTRODUCTION

The InterMet Meteorological Operating System (iMetOS) provides operator control of the receiver (except in the case of the iMet-3150), radiosonde decoder functions, recording and processing of data transmitted by the radiosonde, and generation of operator-selected meteorological data, messages and graphs in real time during and/or after flight.

An additional function of the iMetOS is playback of flights from previously recorded data files.

4.2 MODES OF OPERATION

The iMetOS modes of operation are:

- **Real Flight**: This option is intended for launch of an actual radiosonde. Real flight is described in CHAPTER 3.
- **Simulated Flight**: This option is intended for playback of a previously implemented flight (for training or data analysis purposes). The procedure for simulated flights is described in Section 4.6.

All operations directly related to radiosonde flights (preflight, in-flight and post-flight) are discussed in this chapter, including report and message generation, graph generation, and viewing of reports and messages.

System Setup is discussed in CHAPTER 6.

4.3 LOG FILES

The iMetOS utilizes two different types of log files to record flight data: a raw log file and a processed log file.

4.3.1 Raw Log File

The raw log file (*.RTX) contains a log of the communications between the iMetOS and the devices used for the real flight. This file is necessary to view a simulated flight. A record is recorded when data is received from each device that the iMetOS is communicating with. Each record is recorded as received with a space separated PC time field appended to the end.

The iMetOS uses the raw log file to play back a simulated flight. Any edited data from before will then be lost, as the iMetOS will create a new processed log file. Some lines will change in format depending on the radiosonde type and receiving antenna used for the flight.

An excerpt from an .rtx file is shown below, using an iMet-1-AB radiosonde...

```
$SPS,DataPacket,1233086887,1,1,111.02,-59.86,26.59,43.09924,-84.02167,15347.03,48.00,-
1.40,5.14,1233086887,100,100,100,100 20:08:07
$SPS,DataPacket,1233086888,1,1,110.99,-59.83,26.47,43.09923,-84.02107,15352.11,48.65,-
1.29,5.06,1233086888,100,100,100,100 20:08:08
$SPS,DataPacket,1233086889,1,1,110.85,-59.85,26.48,43.09922,-84.02048,15357.02,47.76,-
1.02,4.90,1233086889,100,100,100,100 20:08:09
$SPS,DataPacket,1233086890,1,1,110.78,-59.85,26.48,43.09921,-
84.01991,15362.29,47.03,0.22,5.71,1233086890,100,100,100,100 20:08:10
$SPS,DataPacket,1233086891,1,1,110.68,-59.82,26.46,43.09922,-
84.01933,15367.51,46.81,0.89,4.86,1233086891,100,100,100,100 20:08:11
$SPS,DataPacket,1233086892,1,1,110.61,-59.82,26.53,43.09922,-
84.01876,15372.14,46.81,0.14,4.62,1233086892,100,100,100,100 20:08:12
```

```
$SPS,DataPacket,1233086893,1,1,110.50,-59.77,26.56,43.09922,-84.01818,15376.83,48.06,-
0.43,4.91,1233086893,100,100,100,100 20:08:13
$SPS,DataPacket,1233086894,1,1,110.42,-59.73,26.43,43.09922,-84.01759,15381.49,49.24,-
0.56,4.52,1233086894,100,100,100,100 20:08:14
$SPS,DataPacket,1233086895,1,1,110.31,-59.67,26.42,43.09921,-84.01698,15386.06,49.13,-
0.58,4.76,1233086895,100,100,100,100 20:08:15
$SPS,DataPacket,1233086896,1,1,110.16,-59.57,26.49,43.09921,-
84.01638,15390.92,49.21,0.28,4.98,1233086896,100,100,100,100 20:08:16
$SPS,DataPacket,1233086897,1,1,110.15,-59.51,26.36,43.09921,-
84.01578,15395.64,48.97,0.19,4.54,1233086897,100,100,100,100 20:08:17
```

4.3.2 Processed Log File

The processed log file (*.LOG) contains the smoothed data and, if the user performs any data editing, edited data. The contents of this file are what the iMetOS uses to generate the met reports and graphs. The log file contains seventeen space separated ASCII fields. Each record is at a one second time increment.

The iMetOS uses the processed log file to generate the reports and graphs. If a user edits the data, only the processed log file will be changed. Simulating the flight will cause the iMetOS to create a new processed log file from the raw log file, losing any edits to the data previously performed.

To create reports and graphs without simulating the flight, the user should simply use the File → Load Log menu item.

A small excerpt from a .log file is shown below. Column numbers are not included in the .log file. The fields are described in Table 4-1.

```
  1     2       3     4       5     6      7      8      9     10     11        12          13          14     15    16 17
-8.00  265.41  73.00 986.320  227.6 0.0000 0.0000 5.0615 12.00   0.0 0000002F 42.8911018 -85.5559006  -8.00  227.7 0.0 1
-8.06  265.35  73.22 985.834  231.5 0.0000 0.0000 5.1197 12.01   8.8 0000002F 42.8910713 -85.5558014  -8.06  231.5 0.0 1
-8.12  265.29  73.43 985.349  235.3 0.0000 0.0000 5.1152 12.27  17.5 0000002F 42.8910408 -85.5557022  -8.11  235.4 0.0 1
-8.18  265.23  73.65 984.863  239.1 0.0000 0.0000 5.1198 12.53  26.3 0000002F 42.8910103 -85.5556030  -8.16  239.2 0.0 1
-8.23  265.17  73.86 984.378  242.9 0.0000 0.0000 5.1320 12.80  35.1 0000002F 42.8909798 -85.5555038  -8.22  243.0 0.0 1
-8.29  265.11  74.08 983.895  246.8 0.0000 0.0000 5.1497 13.01  43.7 0000002F 42.8909531 -85.5554047  -8.27  246.8 0.0 1
-8.35  265.05  74.30 983.410  250.6 0.0000 0.0000 5.1598 13.20  52.4 0000002F 42.8909225 -85.5553055  -8.33  250.7 0.0 1
```

Table 4-1: iMetOS Processed Log File Column Definitions

Column	Description	Units
1	Temperature	Degrees Celsius (°C)
2	Virtual Temperature	Degrees Kelvin (K)
3	Relative Humidity	Percent (%)
4	Smoothed Pressure	Hectopascals (hPa)
5	Geopotential Height	Meters (m)
6	RDF Elevation Angle	Radians (rad)
7	RDF Azimuth Angle	Radians (rad)
8	Wind Direction	Radians (rad)
9	Wind Speed	Knots (kts)
10	Slant Range	Meters (m)
11	Status Flags	N/A
12	Latitude	Degrees (°)
13	Longitude	Degrees (°)

Column	Description	Units
14	Temperature (Raw)	Degrees Celsius (°C)
15	Geometric Height (GPS)	Meters (m MSL)
16	Record Time (0 if interpolated)	Seconds (s)
17	Height Status	N/A

For the iMet-3150, there is no RDF. Therefore, azimuth and elevation angles will always be zero.

4.4 IMETOS FLIGHT SCREEN

The iMetOS runs under Microsoft Windows and utilizes all standard Windows function and screen design concepts.

The Flight Screen (see Figure 4-1) is the principal screen for iMetOS operations and is a typical menu driven Windows screen.

The title bar, at the top of the screen, gives the name of the meteorological system.

The menu bar, immediately below the title bar, lists the additional functions available from the Flight Screen: File, PreFlight, Reports, Graph, View, Utilities, Setup and Help.

Reports, graphs, etc. selected by means of the menu bar or toolbar are displayed as panes superimposed on the Flight Screen and may be sized as desired by using the mouse. More than one report/graph may be displayed as individual windows.

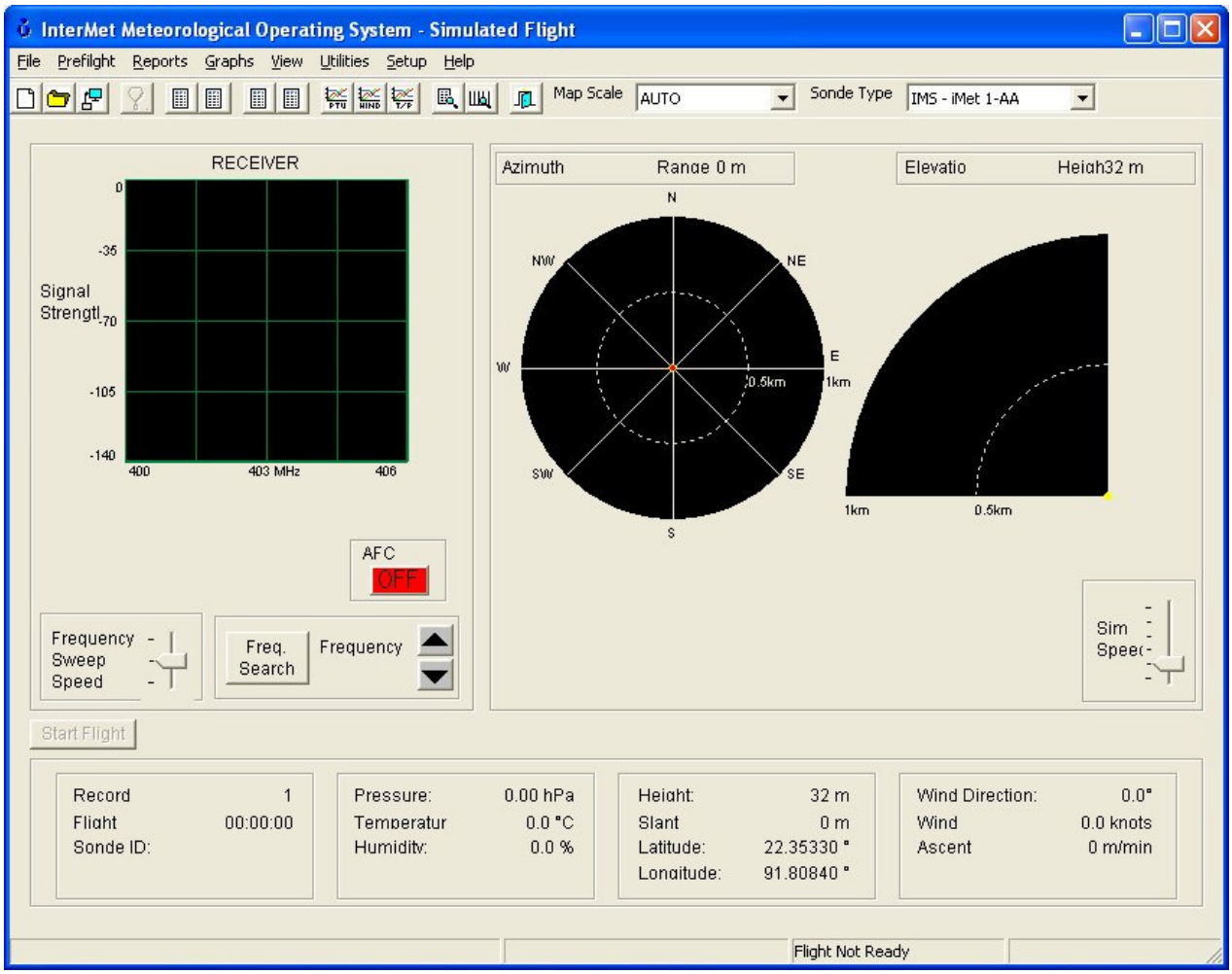


Figure 4-1: 403 MHz Flight Screen

4.4.1 iMetOS Menu Bar

4.4.1.1 File

This menu enables creation of a new file (for a new real flight), opening of a radiosonde parameters flight file (for a simulated flight), loading of a log file (for viewing reports and graphs of a previously performed flight), and exit from the program. New files cannot be opened when a real or simulated flight is in progress.

4.4.1.2 PreFlight

This menu enables entry and modification of preflight data (for a new real flight) or review and editing of previously entered preflight data (for a simulated flight), and loading of calibration data.

4.4.1.3 Reports

This menu generates meteorological reports and messages according to a list of reports selected as part of the system setup (see CHAPTER 6). The report output device and WMO indicator are also set through the Reports menu.

Table 4-2: Available WMO/Meteorological reports in iMetOS

Report	Description	File Extension	Misc
Standard Levels Report	Plain text version of TTAA, TTCC, PPAA, and PPCC	.STD	Specific to iMetOS
Significant Levels Report	Plain text version of TTBB, TTDD, PPBB, and PPDD	.SIG	Specific to iMetOS
Physical Values Report	Plain text version of the iMetOS .log file, in 10 second increments	.PYS	Specific to iMetOS
Temp Report	Coded message of TTAA, TTBB, TTCC, and TTDD	.TEM	FM 35 – TEMP FM 36 – TEMP SHIP FM 38 – TEMP MOBIL
Pilot Report	Coded message of PPAA, PPBB, PPCC, and PPDD	.PIL	FM 32 – PILOT FM 33 – PILOT SHIP FM 34 – PILOT MOBIL
Temp-1 Message	Coded message of TTAA, TTBB, and PPBB	.TP1	Fixed Land Station Ship Mobile Land Station
Temp-2 Message	Coded Message of TTCC, TTDD, and PPDD	.TP2	Fixed Land Station Ship Mobile Land Station
NWS Identification Record	160 character code of station number, latitude, longitude, altitude, date/time of release, ascension number, observer initials, & more	.HDR	Generated in C:\UpperAir\yyyy\month
NWS Data Record	80 character code/record of ascension number, time since release, pressure, height, temperature, relative humidity, dew point depression, & more	.DAT	Generated in C:\UpperAir\yyyy\month
NWS High Resolution Data Record	80 character code/record at two second intervals of ascension number, time since release, pressure, height, temperature, relative humidity, dew point depression, & more	.HRS	Generated in C:\UpperAir\yyyy\month

To switch the Temp Report, Pilot Report, Temp-1 Message, or Temp-2 message from a fixed land station to ship or mobile land station, set the station type from the Setup | WMO Coding Parameters 1 menu (Section 6.8).

Table 4-3: Available military reports in iMetOS

Report	File Extension
Computer (MetCM)	.CMP
Ballistic Type 2	.BL2
Target Acquisition	.TAM
Fallout	.FOM

Report	File Extension
Sound Ranging	.SRM
Ballistic Type 3	.BL3

4.4.1.4 Graphs

This menu generates all of the iMetOS graphics, including PTU, winds, tephigram (T/log P), PTU vs. height, density vs. height, skew-T log-P, Stuve, and hodograph, for a real or simulated flight. Graphics can be called up during or after completion of a flight.

4.4.1.5 View

This menu allows for viewing of reports and messages. Reports can be called up during or after completion of a flight.

Other View menu functions include:

- Location in Lat/Lon (UTM): when selected, location will be displayed in degrees; if unchecked, location will be displayed in UTM coordinates
- Angles in Mils (Degrees): when selected, angles will be displayed in mils; otherwise, degrees
- Pressure in hPa (mb): when selected, pressure will be displayed in hPa; otherwise, millibars
- Height in Meters (Feet): when selected, height will be displayed in meters; otherwise, feet
- Temperature in °C (K): when selected, temperature will be displayed in degrees Celsius; otherwise, Kelvin
- Wind Speed in Knots (m/s): when selected, wind speed will be displayed in knots; otherwise, meters per second
- 2D Slant Range (3D): when selected, the slant range will be the horizontal distance (along the ground) to the radiosonde's location; otherwise, it will be the straight-line distance between the receiving antenna and radiosonde.

4.4.1.6 View GPS Information

The GPS Data window (Figure 4-2) displays GPS data from the base station and radiosonde. Depressed boxes in the Satellite Constellation area indicates that the satellite is being used by the GPS receiver in the radiosonde (Sonde column) or by a differential receiver in the base station (Base column), for the GPS solution.

NOTE

The iMet-1 radiosonde, when used with the iMet-3150, does not report the satellites that are being received. To verify sonde GPS, look for radiosonde latitude, longitude, altitude, and an occasional change for north, east, and vertical velocity.

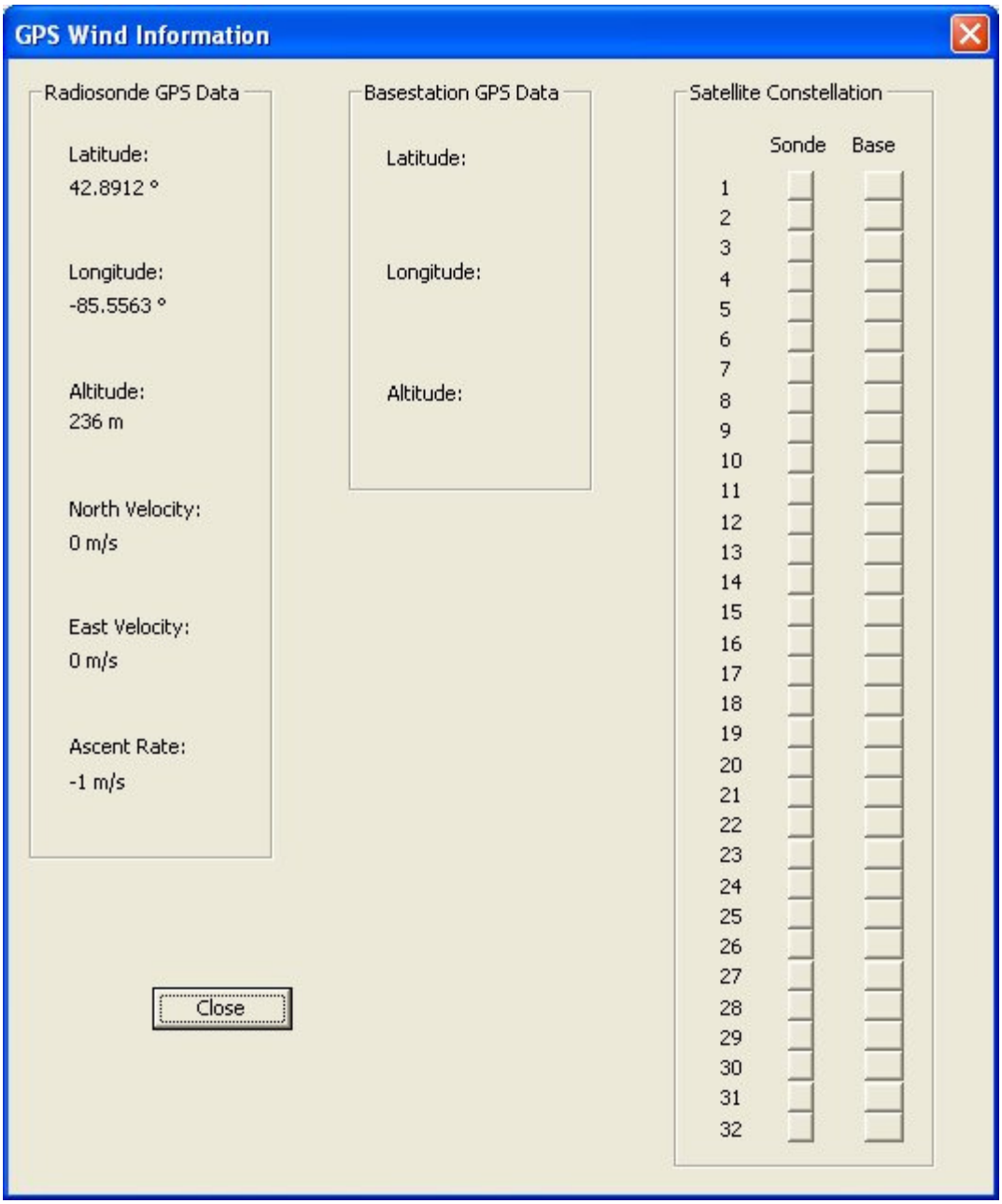


Figure 4-2: GPS Data Window

4.4.1.7 Utilities

This menu contains various utility operations (see CHAPTER 5).

4.4.1.8 Setup

This menu contains menu items for system setup (see CHAPTER 6).

4.4.1.9 Help

This menu contains information about the iMetOS.

4.4.2 iMetOS Toolbar

The toolbar, immediately below the menu bar, enables "one-touch" rapid performance of the following frequently implemented operations:

4.4.2.1 New

This button enables creation of a new file (for a new real flight, provided that there is no real or simulated flight in progress).

4.4.2.2 Open

This button enables opening of a sonde parameters flight file (for a simulated flight).

4.4.2.3 Load log

This button enables loading of a log file (for viewing reports and graphs of a previously recorded flight).

4.4.2.4 PreFlight

This button enables entry and/or modification of preflight data (for a new real flight) or review and editing of previously entered preflight data (for a simulated flight).

4.4.2.5 Report 1 through Report 4

These buttons display the first two WMO reports and the first two military reports selected as part of the system setup, for a real or simulated flight in progress or after termination.

4.4.2.6 PTU, Wind, T/P

These buttons enable generation of PTU graph, winds graph and tephigram (T/log P graph), respectively, for a real or simulated flight in progress or after termination, or a previously recorded flight.

4.4.2.7 Reports and Messages

This button displays the standard levels report for a previously recorded flight.

4.4.2.8 Physical Values

This button displays the physical values report for flight in progress.

4.4.2.9 Exit

This button exits from system.

4.4.2.10 Map Scale

This pulldown menu enables selection of a map scale for the radial radiosonde plots. Allowable values include AUTO, 1 km, 2 km, 5 km, 10 km, 20 km, 50 km, 100 km, 200 km, and 500 km.

4.4.2.11 Change Sonde Type

The iMet-3150 will only decode signals from InterMet iMet-1 403 MHz radiosondes. This menu pulldown must be set for "iMet 1-AA" (no pressure sensor) or "iMet 1-AB" (pressure sensor included).

4.4.3 iMetOS Status Bar

The status bar, at the bottom of the screen, shows the operation mode (Real Flight or Simulated Flight), flight status (FLIGHT NOT READY, FLIGHT READY, and FLIGHT IN PROGRESS), the date, local time and possibly also GMT time (if selected in System Setup).

4.4.4 Flight Screen Main Body

The main body of the Flight Screen consists of three main areas (receiver, antenna, and telemetry).

4.4.4.1 Receiver Area

Figure 4-3 shows the 403 MHz receiver area of the iMetOS. Note that since the receiver is an external receiver, no data will be displayed here.

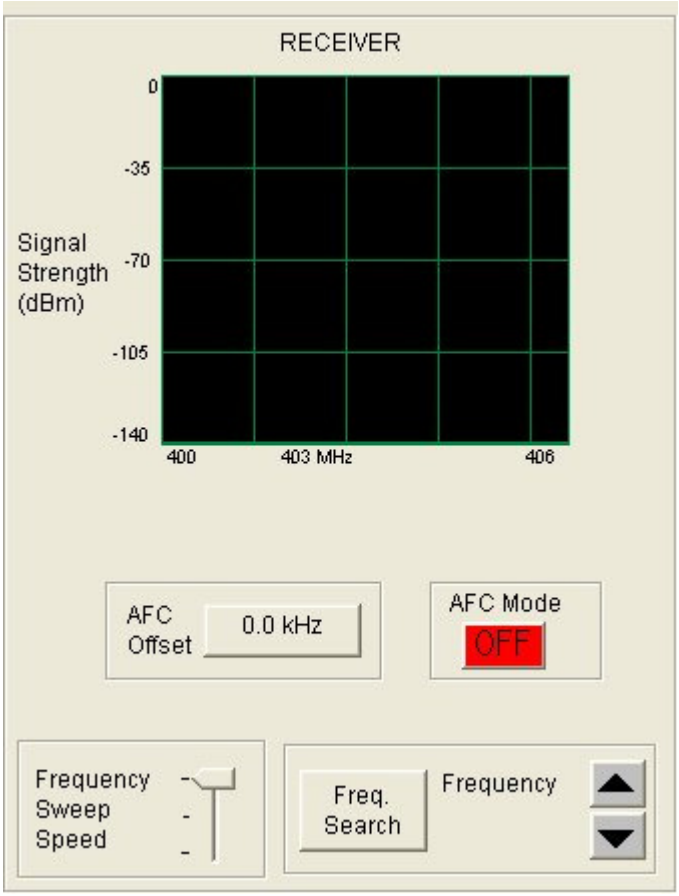


Figure 4-3: 403 MHz Receiver Area

The receiver area, at the top left of screen, displays receiver operating parameters in the following format:

- Signal level: analog format (length of line along a vertical scale in dBm)
- Receiver tuned frequency: analog (position of signal level line along a horizontal scale in MHz) and digital format
- Receiver frequency sweep speed (fast/medium/slow): adjust the frequency step size when the frequency slew buttons are pressed
- AFC ON/OFF: click button

NOTE

The following two selections are disabled if the receiver is in automatic frequency control (AFC) mode.

- Receiver frequency search: activate a one time search for the maximum signal strength; receiver will automatically tune to greatest signal strength found when complete

– Receiver frequency slew: click up [▲] or down [▼] buttons to adjust the receiver's tuned frequency

4.4.4.2 Radiosonde Area

Figure 4-4 shows the Radiosonde Area on the Main Screen.

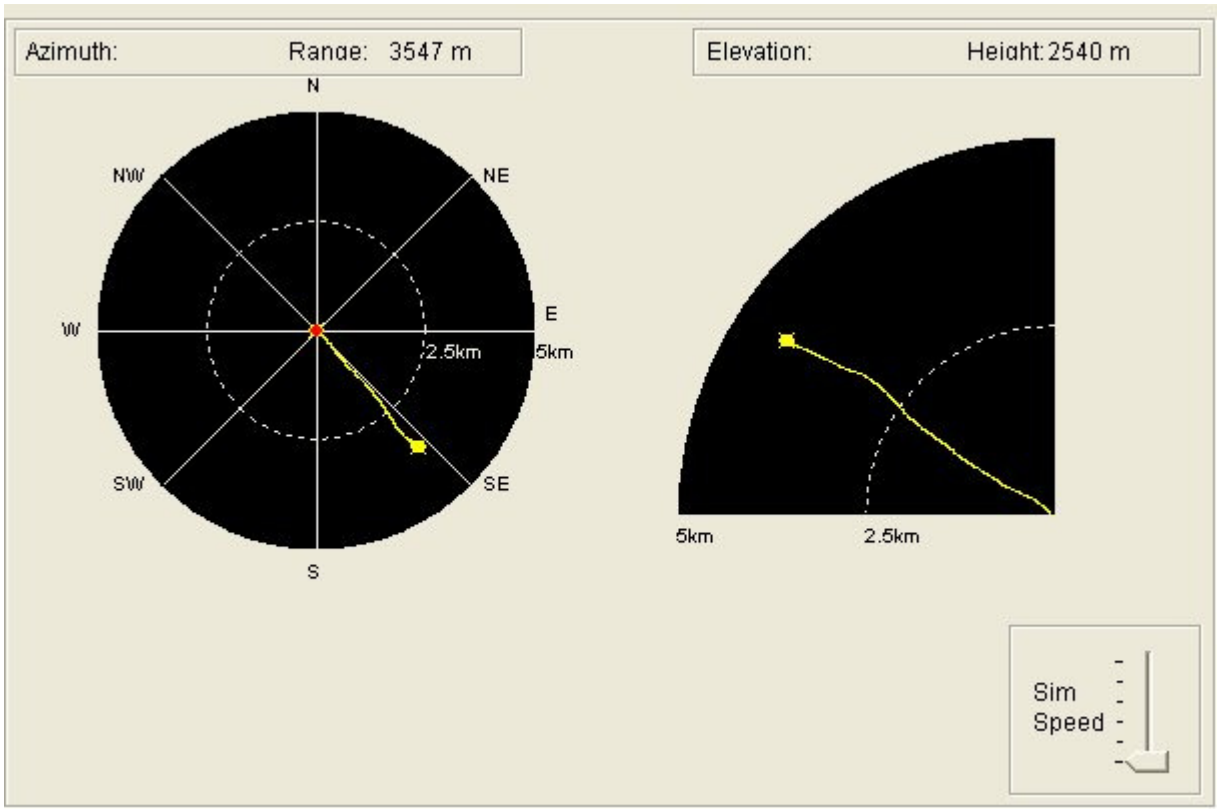


Figure 4-4: 403 MHz Radiosonde Area

The radiosonde area displays radiosonde data in the following format:

– Radiosonde horizontal track: a plot of the relative horizontal path of the radiosonde with the position given by a yellow dot

– Radiosonde vertical track: a plot of the relative vertical path of the radiosonde with the position given by a yellow dot

– The basestation GPS position given by a red dot in the azimuth plot only

The Sim Speed control adjusts the speed of flight simulations when replaying previously recorded flights.

4.4.4.3 Telemetry Area

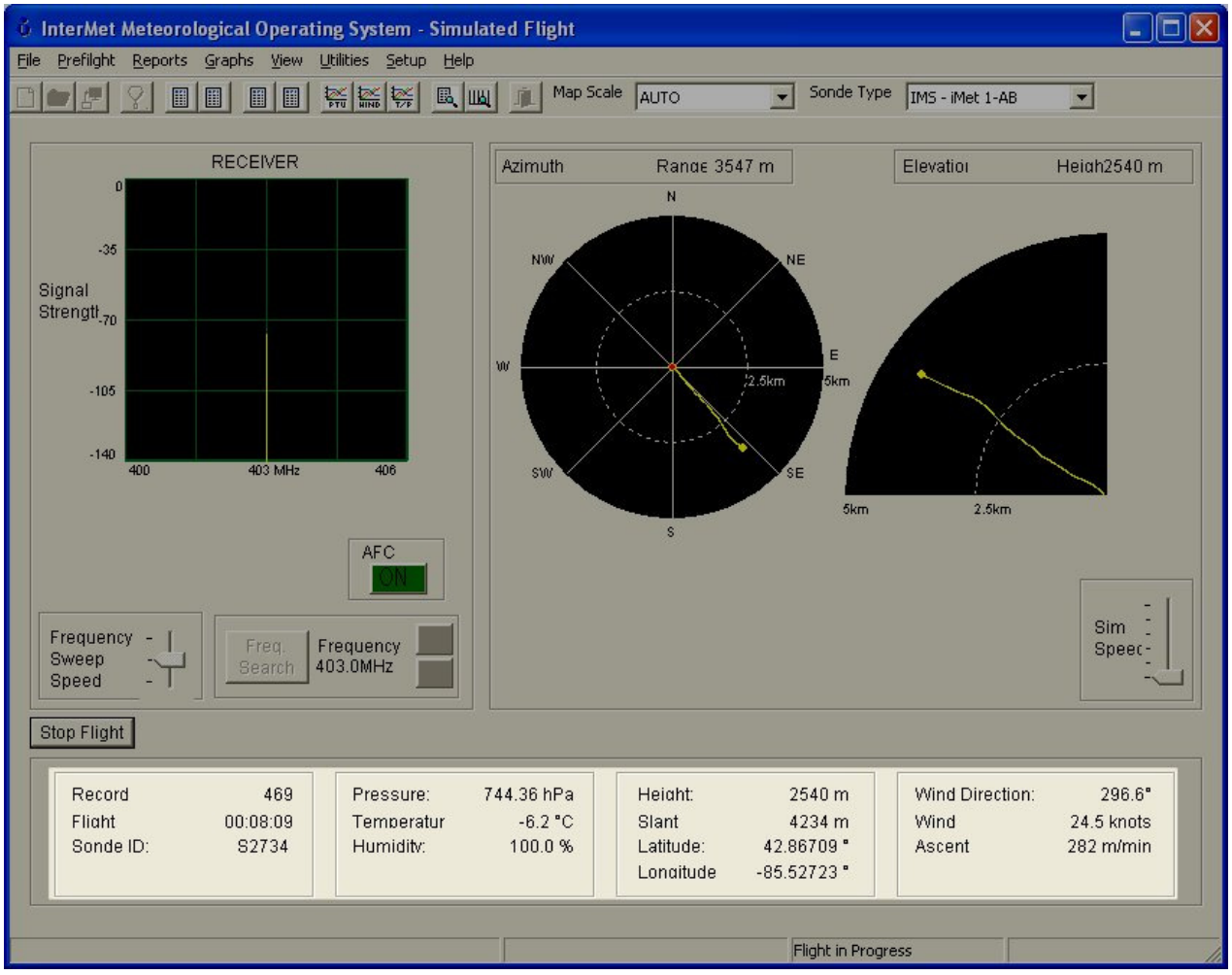


Figure 4-5: Telemetry Area

The telemetry area, at the bottom of the screen, displays the following flight parameters in digital format only:

- Record number
- Flight clock
- Radiosonde ID
- PTU
- Height (above sea-level)
- Slant range - the distance between the preflight position and radiosonde
- Latitude (base station only until radiosonde reports GPS data)
- Longitude (base station only until radiosonde reports GPS data)
- Wind direction
- Wind speed

- Ascent rate

4.5 IMETOS GRAPHS

Graphs may be generated for a real or simulated flight in progress or after termination, or for a previous flight with valid data files.

The graph cursor may be moved to any desired point on the graph by moving the mouse. A table to the right of the graph, titled "View", displays physical values for point at which the cursor is located, for viewing only.

4.5.1 Graph Menu Bar

The menu bar, immediately below the title bar, lists the additional functions available from any of the graph screens: File, Edit, Scale, Zoom, Interpolate and SigPoints

- File: enables loading of a log file (for viewing graphs of a previously recorded flight), saving of a log file (after modification of log file data - see below), printing of the respective graph, and exit from the graph screen
- Edit: enables editing and cutting of graph data
- Scale: enables selection of desired pressure scale (1000 - 10 mB, 1000 - 100 mB, 1000 - 500 mB) on PTU and tephigram graphs, and desired wind scale (0° - 360°, 180 - 180°) on winds graph
- Zoom: enables zooming in to pressure level selected by means of cursor, displaying ±10% above/below that level, or zooming out to view the entire graph, on PTU and winds graphs
- Interpolate: enables interpolation of values between two selected points of the graph
- SigPoints: enables location, insertion and deletion of significant points relevant to the graph

4.5.2 Graph Toolbar

The toolbar, immediately below the menu bar, enables "one-touch" execution of the following frequently implemented operations:

- Load log: enables loading of a log file (for viewing graphs of a previously recorded flight)
- Save log: enables saving of a log file (after modification of log file data - see below)
- Print: enables printing of the respective graph
- Cut: enables cutting of a selected portion from graph
- Edit: enables editing of a selected point on graph
- Pressure Scale: enables selection of desired pressure scale (1000 - 10 mB, 1000 - 100 mB, 1000 - 500 mB) on PTU and tephigram graphs
- Wind Scale: enables selection of desired wind scale (0° - 360°, 180 - 180°) on winds graph.
- Zoom In: enables zooming in to pressure level selected by means of cursor, displaying ±10% above/below that level, on PTU and winds graphs.
- Zoom Out: enables zooming out to view the entire graph, on PTU and winds graphs.

4.5.2.1 Editing Data in Graph Mode

To edit physical values data for any point, select Edit Data from Edit menu or press Edit button on toolbar. Bring cursor to desired point on graph (by moving mouse) and click. Screen will display a table of physical

values for that point, headed "Edit Physical Values". Edit physical values as desired and press [OK]. The graph will be updated according to edited physical values.

To cut a range of data in any segment of graph which does not appear accurate or which is irrelevant, bring cursor to lower limit of range to be replaced by interpolated data, click, drag cursor to upper limit of range to be replaced by interpolated data, release, and select Cut Data from Edit menu or press [Cut] button on toolbar. This will delete the data within the selected range from the log file of the respective flight.

To interpolate data in any segment of graph which does not appear accurate, bring cursor to lower limit of range to be cut, click, drag cursor to upper limit of range to be cut, release, and select the desired interpolation operation from the Interpolate menu. This will interpolate data for the selected range in the log file of the respective flight.

To insert a Significant Point on graph, bring cursor to desired location for significant point insertion, click, and select the desired Insert function from the SigPoints menu.

To delete a Significant Point from graph, bring cursor to significant point to be deleted, click, and select the desired Delete function from the SigPoints menu.

Any changes made will be saved to the processed log (*.LOG) file, if desired. Closing the graph will bring up a prompt asking if the changes should be saved. Simulating the flight will return the data to its original state.

To superimpose a graph from another flight, select File from graph menu bar or load log button from graph toolbar; select desired file. Graph from previous flight will appear superimposed on present graph.

4.5.2.2 PTU Graph

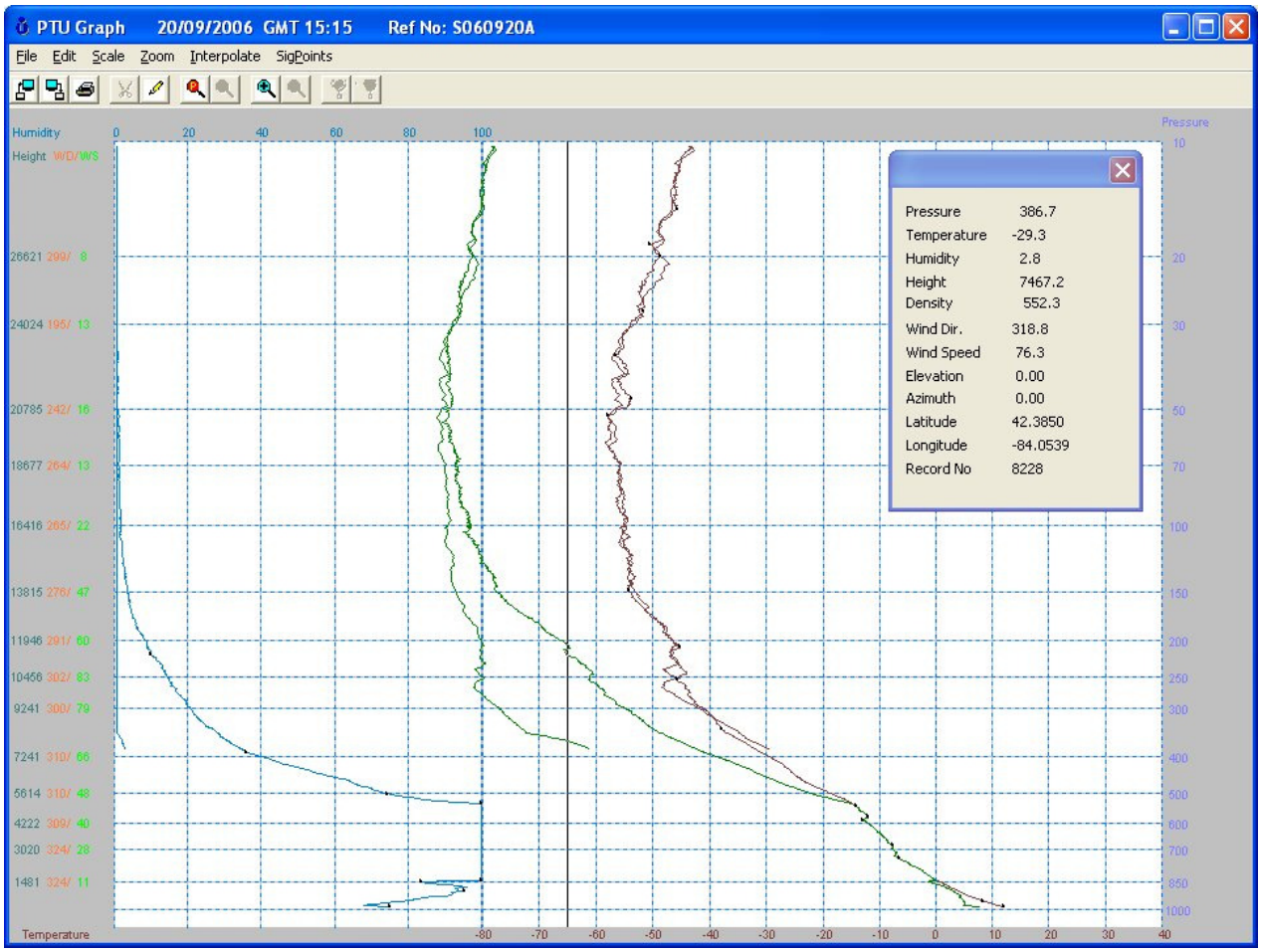


Figure 4-6: PTU Graph

The PTU graph is accessed by pressing [PTU] button on Flight Screen toolbar, and may be sized as desired by means of standard Microsoft Windows screen controls. As a default, temperature is displayed in red; relative humidity in blue; dew point in green (for color customization, see Section 6.2). Pressure standard levels (corresponding to horizontal lines on graph) are displayed in figures at right of screen. For each pressure standard level, the corresponding sonde altitude, wind direction and speed are displayed in figures at left of screen. The title bar displays graph title, flight start date and time, and the flight reference number.

4.5.2.3 Wind Graph

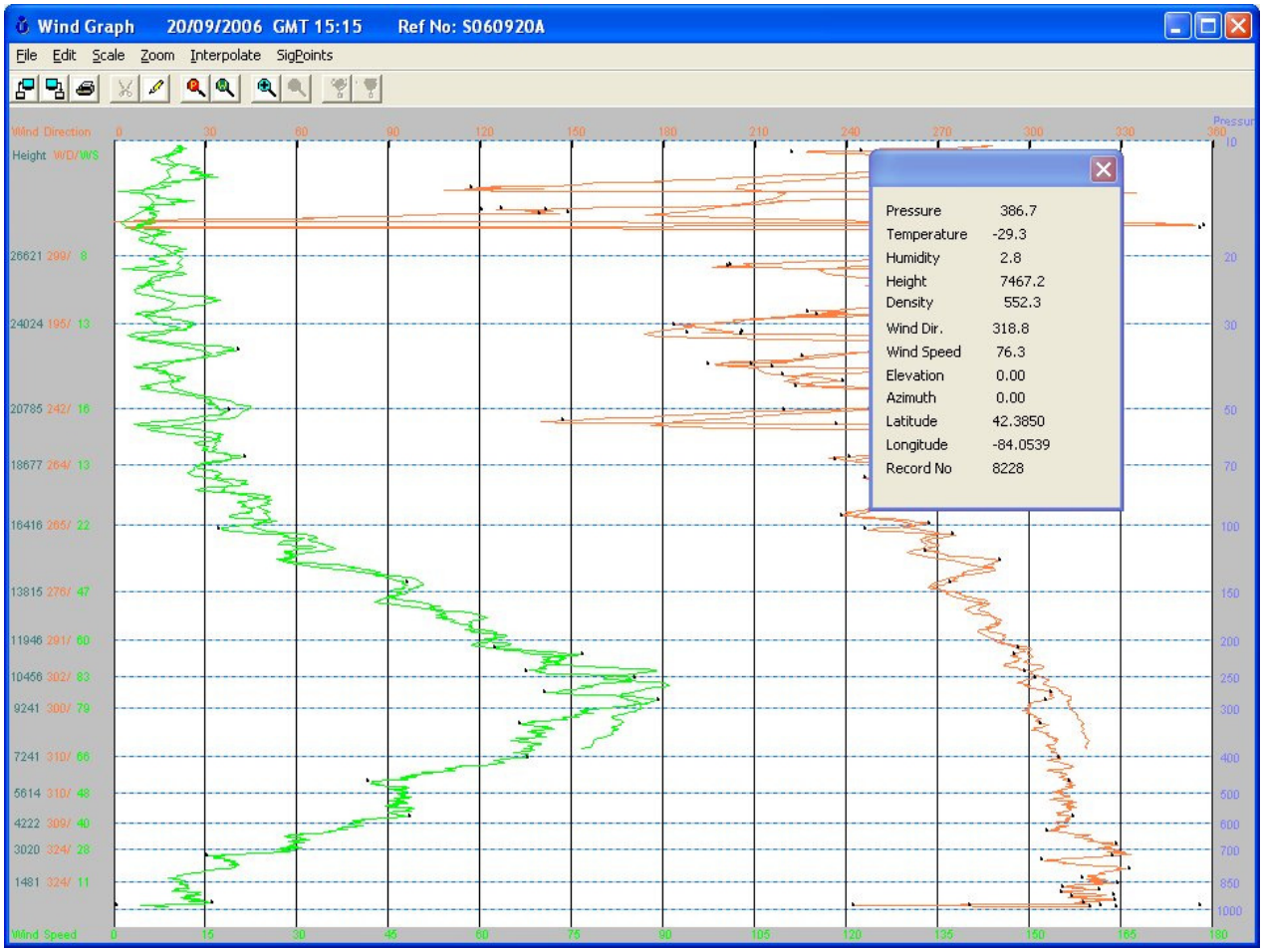


Figure 4-7: Winds Graph

The Winds graph is accessed by pressing [WIND] button on Flight Screen toolbar, and may be sized as desired by means of standard Microsoft Windows screen controls. As a default, wind direction is displayed in green; wind speed is displayed in purple. Pressure standard levels (corresponding to horizontal lines on graph) are displayed in figures at right of screen. For each pressure standard level, the corresponding sonde altitude, wind direction and speed are displayed in figures at left of screen. The title bar displays graph title, flight start date and time, and flight reference number.

4.5.2.4 T/Log P Graph

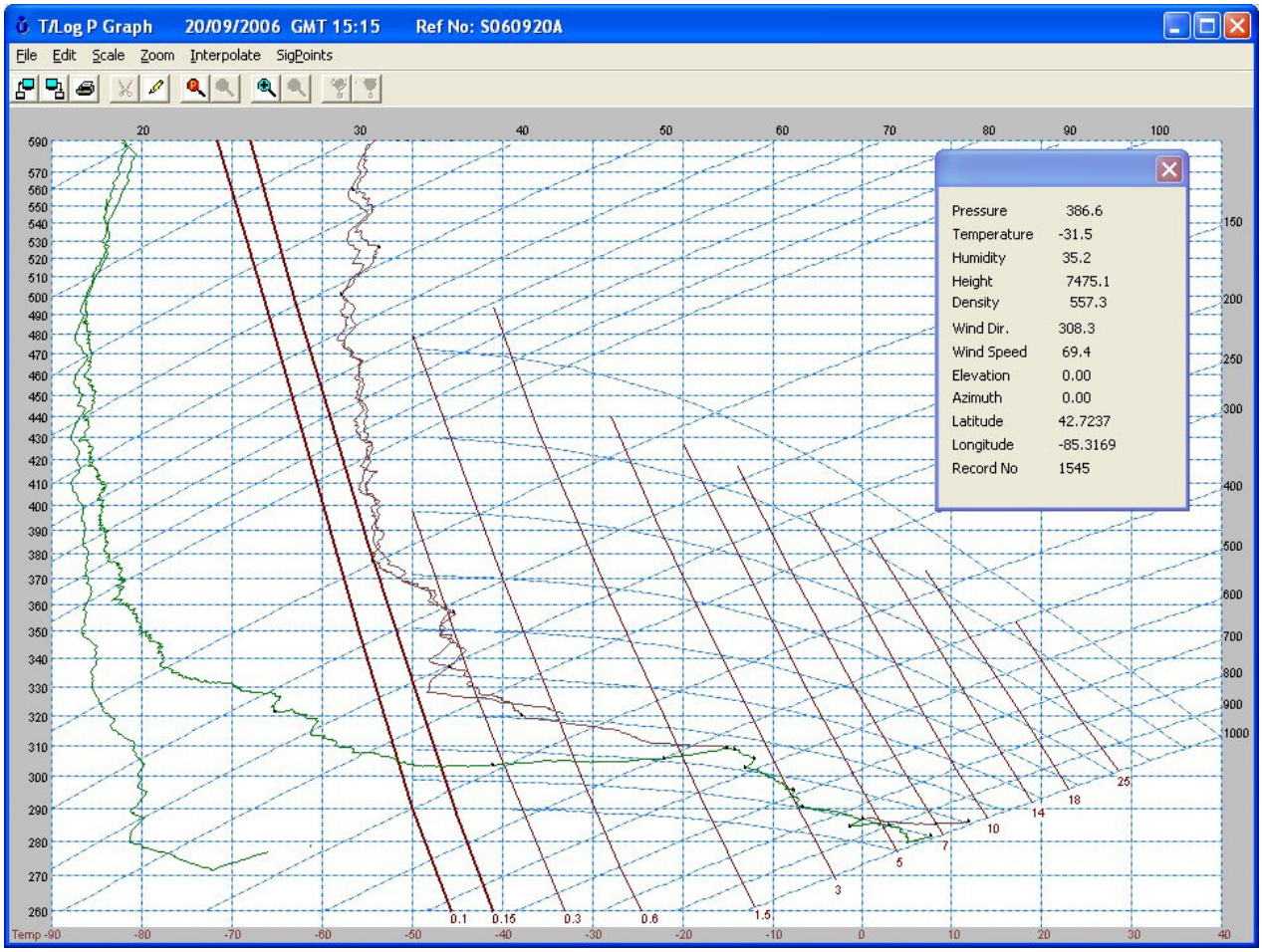


Figure 4-8: T/Log P Graph

The tephigram is accessed by pressing [T/P] button on Flight Screen toolbar, and may be sized as desired by means of standard Microsoft Windows screen controls. As a default, real temperature is displayed in red, dew point as a function of pressure is displayed in green, pressure lines in solid gray, adiabatic lines in dotted gray, and mixing ratio in brown. The title bar displays graph title, date and time, and file number.

4.5.3 Report Generation

Partial meteorological messages and reports may be generated at any time after launch in simulated or real flight modes. To enable reports to be displayed, printed or transmitted, select Reports from the Flight Screen menu bar. The following screen will be displayed:

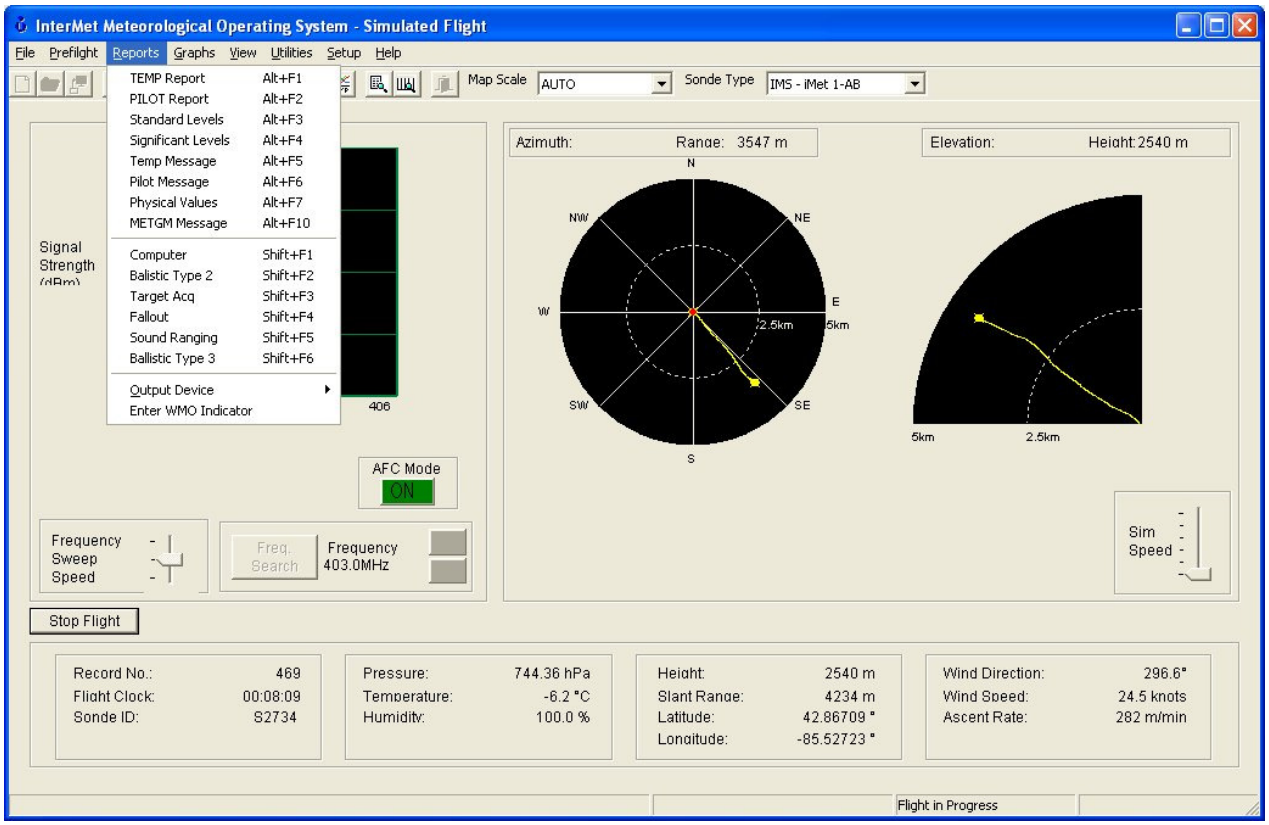


Figure 4-9: Report Generation

First select desired output device (default: screen).

Select the desired report by means of mouse or indicated function keys. If generation of all reports is desired, select Create All Reports. Note that only the reports with the All Checkbox checked will generate with the Create All Reports (see Section 6.5 and 6.6). If the generation of coded reports only is desired, i.e. no informational text, select Code Only.

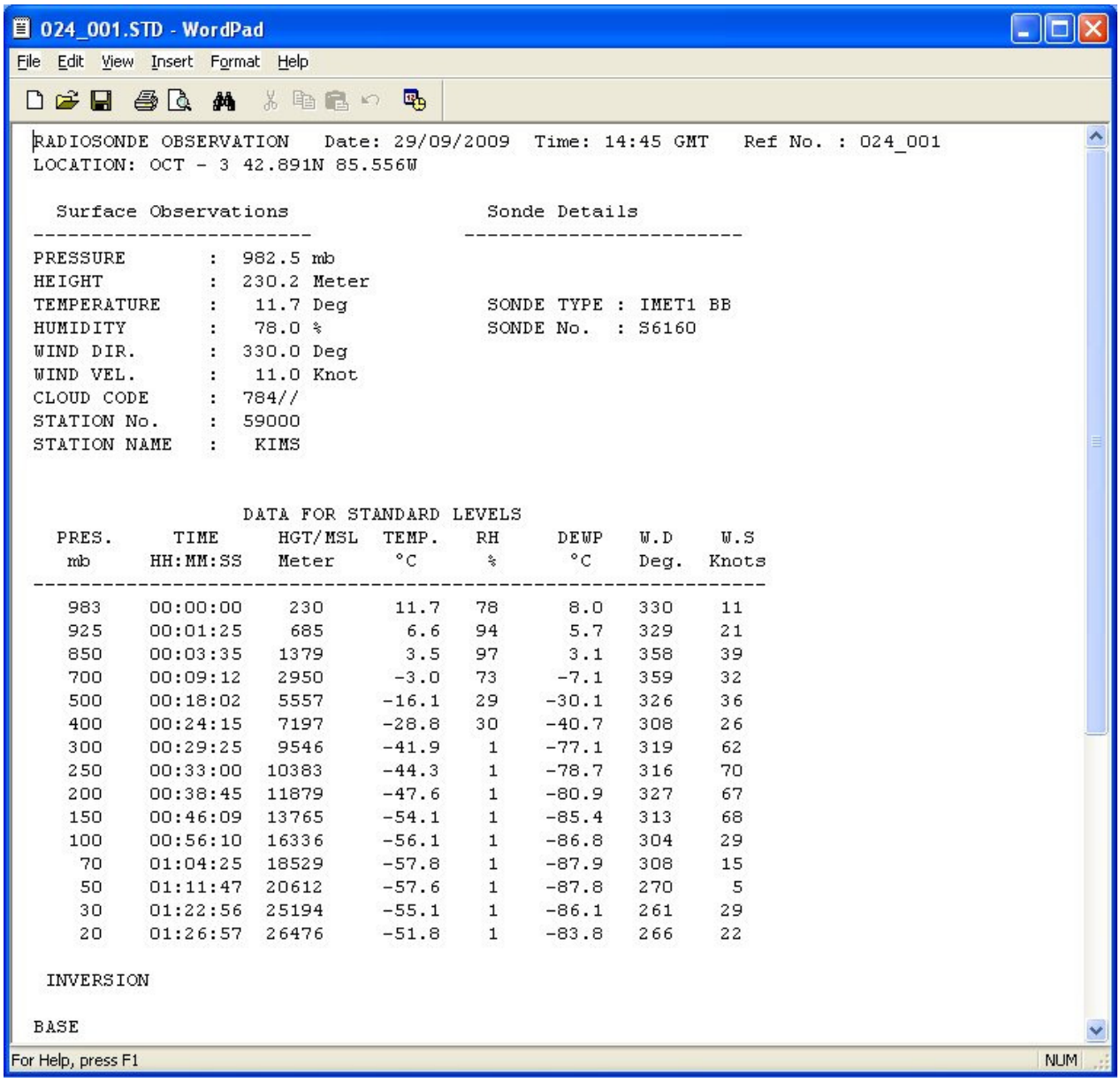


Figure 4-10: Standard Levels

Reports are generated in plain text format and opened using WordPad (included with Windows). Each report generated is saved in a file whose name is composed of the flight reference number and the suffix appropriate to the report type; for example, in the sample report screen (Standard Levels) displayed in Figure 4-10, 024_001 is the flight reference number and .STD designates a Standard Levels report.

4.5.3.1 Report Menu bar

The menu bar is a standard Windows menu bar.

4.5.3.2 Report Toolbar

The toolbar is a standard Windows toolbar.

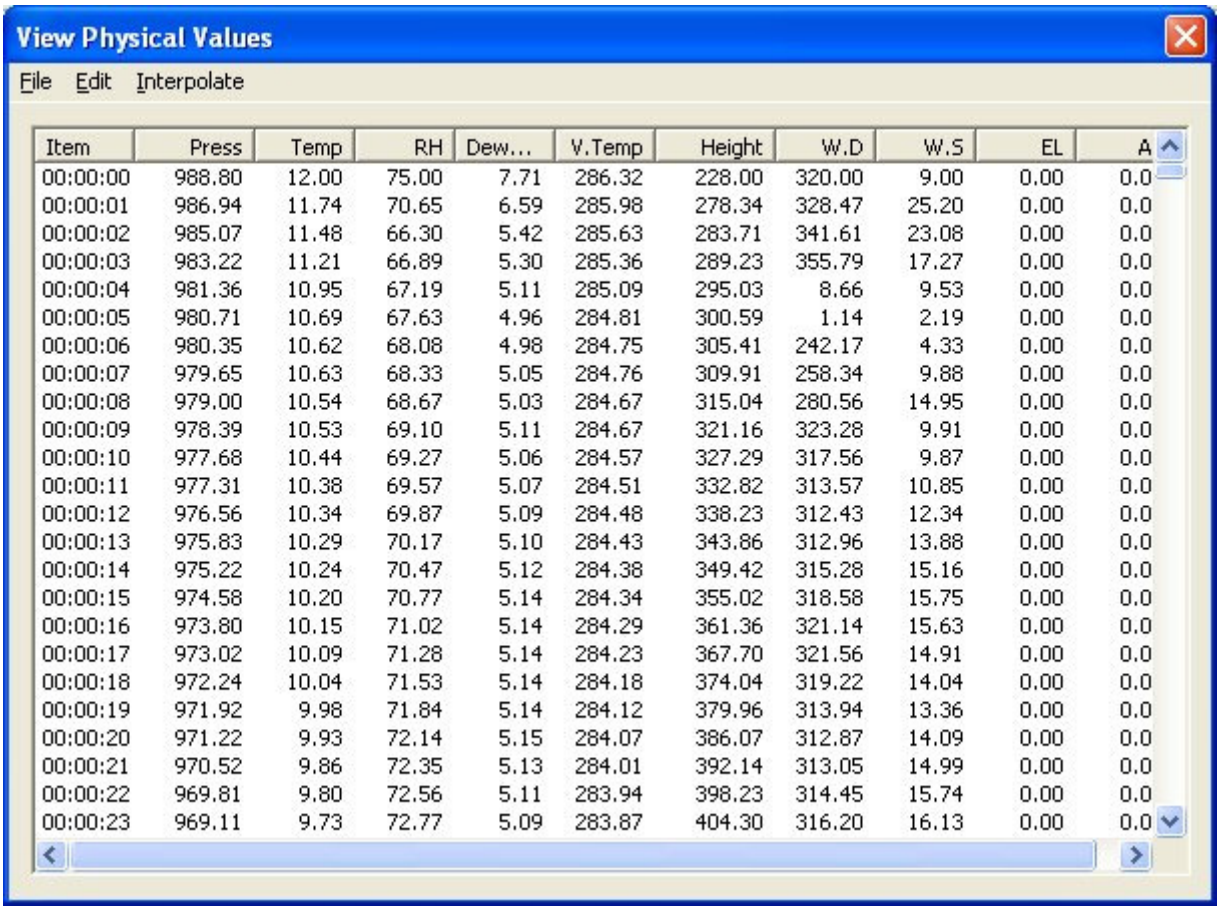
To select a portion of the report for editing, bring cursor to upper limit of desired portion (by moving the mouse), click, press and hold [SHIFT] key on computer keyboard, drag cursor to lower limit of desired

portion, release. Now cut or copy marked portion as desired.

4.5.4 Viewing Physical Values

The View Physical Values function enables viewing of physical values for a real or simulated flight in progress or after termination, or for a previously implemented flight, and interpolation of values for any segment which appears inaccurate.

The View Physical Values screen is selected from the View menu of the Flight screen. A sample View Physical Values screen is displayed below.



Item	Press	Temp	RH	Dew...	V.Temp	Height	W.D	W.S	EL	A
00:00:00	988.80	12.00	75.00	7.71	286.32	228.00	320.00	9.00	0.00	0.0
00:00:01	986.94	11.74	70.65	6.59	285.98	278.34	328.47	25.20	0.00	0.0
00:00:02	985.07	11.48	66.30	5.42	285.63	283.71	341.61	23.08	0.00	0.0
00:00:03	983.22	11.21	66.89	5.30	285.36	289.23	355.79	17.27	0.00	0.0
00:00:04	981.36	10.95	67.19	5.11	285.09	295.03	8.66	9.53	0.00	0.0
00:00:05	980.71	10.69	67.63	4.96	284.81	300.59	1.14	2.19	0.00	0.0
00:00:06	980.35	10.62	68.08	4.98	284.75	305.41	242.17	4.33	0.00	0.0
00:00:07	979.65	10.63	68.33	5.05	284.76	309.91	258.34	9.88	0.00	0.0
00:00:08	979.00	10.54	68.67	5.03	284.67	315.04	280.56	14.95	0.00	0.0
00:00:09	978.39	10.53	69.10	5.11	284.67	321.16	323.28	9.91	0.00	0.0
00:00:10	977.68	10.44	69.27	5.06	284.57	327.29	317.56	9.87	0.00	0.0
00:00:11	977.31	10.38	69.57	5.07	284.51	332.82	313.57	10.85	0.00	0.0
00:00:12	976.56	10.34	69.87	5.09	284.48	338.23	312.43	12.34	0.00	0.0
00:00:13	975.83	10.29	70.17	5.10	284.43	343.86	312.96	13.88	0.00	0.0
00:00:14	975.22	10.24	70.47	5.12	284.38	349.42	315.28	15.16	0.00	0.0
00:00:15	974.58	10.20	70.77	5.14	284.34	355.02	318.58	15.75	0.00	0.0
00:00:16	973.80	10.15	71.02	5.14	284.29	361.36	321.14	15.63	0.00	0.0
00:00:17	973.02	10.09	71.28	5.14	284.23	367.70	321.56	14.91	0.00	0.0
00:00:18	972.24	10.04	71.53	5.14	284.18	374.04	319.22	14.04	0.00	0.0
00:00:19	971.92	9.98	71.84	5.14	284.12	379.96	313.94	13.36	0.00	0.0
00:00:20	971.22	9.93	72.14	5.15	284.07	386.07	312.87	14.09	0.00	0.0
00:00:21	970.52	9.86	72.35	5.13	284.01	392.14	313.05	14.99	0.00	0.0
00:00:22	969.81	9.80	72.56	5.11	283.94	398.23	314.45	15.74	0.00	0.0
00:00:23	969.11	9.73	72.77	5.09	283.87	404.30	316.20	16.13	0.00	0.0

Figure 4-11: Physical Values

4.5.4.1 Data Interpolation

To interpolate data for a segment of physical values which appears inaccurate, bring cursor to upper limit of time to be replaced by interpolated data, click, press and hold [SHIFT] key on computer keyboard, drag cursor to lower limit of time to be replaced by interpolated data, release, and select the desired interpolation operation from the Interpolate menu. This will interpolate data for the selected range in the log file of the respective flight.

4.5.5 End of Flight

When a balloon burst is detected, the message "Balloon burst detected. Do you want to terminate the flight?" will flash on the screen and audio alarm will sound. Click [Yes] to stop flight.

If ending flight before balloon burst is desired for any reason, press [Stop Flight] button on Flight Screen to

stop flight processing. The iMetOS will ask "Do you want to terminate the flight in progress? To terminate flight, click [Yes].

When flight has been terminated, "Flight Not Ready" will be displayed on status bar of Flight Screen.

4.5.6 Exiting the iMetOS

To exit from system, press [Exit] from File menu or toolbar.

4.6 SIMULATED FLIGHTS

The simulated flight function can be used to both replay a previously recorded flight or to view its reports and graphs.

To view graphs and reports without replaying an entire flight, select Load Log from the File menu on the Flight Screen menu bar, or from the Flight Screen toolbar. Select the desired file name and click [Open]. The reports and graphs will be accessible as if the flight had been recently terminated.

To initiate a simulated flight, open iMetOS and select Simulate Flight (Figure 3-2).

When the Main Flight Screen appears (Figure 3-16), select Open from File menu on the Flight Screen menu bar, or from the Flight Screen toolbar. Select the desired flight (only flights of the selected radiosonde type will display) and click [Open]. The Pre-Flight Screen will automatically be displayed, with preflight data for this flight entered.

Modify data if desired and click [OK].

Flight screen will now appear with "Flight Not Ready" displayed in status bar at bottom of screen as data processing has not yet begun. Press the [Start Flight] button to begin the simulation. The replay speed can be adjusted using the Sim Speed control located on the Main Flight Screen.

4.6.1 Simulated Flight Procedures

Press [Start Flight] to start the recorded flight. Flight data will begin updating as if a real flight was in progress.

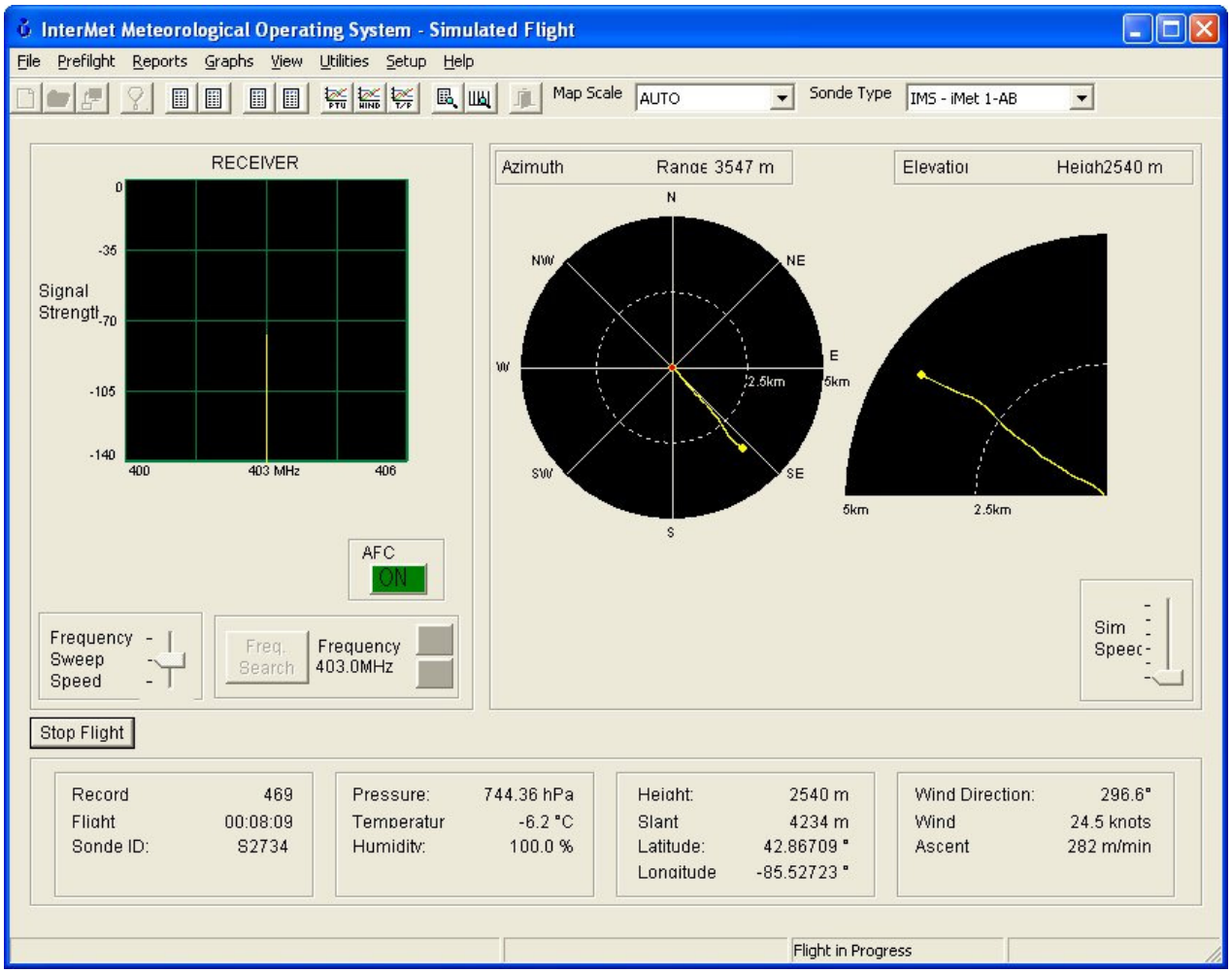


Figure 4-12: Simulated Flight

As a default, a simulated flight will proceed at approximately normal speed. To speed up or pause the simulation, slide the simulation speed bar up to speed up, or down to slow down. The lowest speed is paused.

Graphics and reports can be accessed in the same manner as Real Flights.

4.7 IN THE EVENT OF A CRASH

In the event that iMetOS crashes in a real flight mode, it may be possible to recover most, if not all, of your flight data. If the MetServer continues to run (on the Windows taskbar, the icon will continue to flash yellow and white), it is possible to continue with the flight. To do so, follow these procedures:

a. Immediately restart iMetOS in [Real Flight] mode.

b. Go to File | New. Enter the following preflight information:
Surface Pressure
Sonde ID
Ascension Number (keep the same)
Release Number (increase by 1)

c. Press [Save].

d. The iMetOS will recognize that the flight has already begun and will log the data.

e. At the end of the flight, terminate the flight as normal. Ignore any reports and graphs. Close iMetOS.

f. Open Windows Explore and browse to the C:\IMS\iMetOS\Flights directory.

g. Make a copy of the original *aaa_rrr*.paa or *aaa_rrr*.pab file and rename the copy *aaa_003*.paa or *aaa_003*.pab (or similar), where *aaa* is the ascension number and *rrr* is the release number.

h. Make a copy of the original *aaa_rrr*.rtx and rename the copy *aaa_003*.rtx (or similar).

i. Open the *aaa_003*.rtx file and the *aaa_rrr+1*.rtx file in Windows Notepad or Wordpad or a similar text editor.

j. Copy and paste the *aaa_rrr+1*.rtx file to the bottom of the *aaa_003*.rtx and save the file.

k. Open iMetOS in a [Simulated Flight] mode and open the *aaa_003*.paa or *aaa_003*.pab file.

l. Press [Save] to the Preflight data.

m. Press [Start Flight] to begin playback of the flight data.

At the conclusion of the flight, the iMetOS will generate the reports and graphs, automatically interpolating for the time that the iMetOS client had crashed.

To help us understand what happened, please zip and e-mail all of the files (see list in Section 10.3) to InterMet Support with the subject line "Flight that crashed iMetOS". This will help us to improve iMetOS in the future.

If it is necessary to have all of the flight data restored, it is possible, but it will require up to one business day. Please zip and e-mail all of the files (see list in Section 10.3) to InterMet Support with the subject line "Please Restore This Crashed Flight". We will return your flight data as soon as possible.

CHAPTER 5
IMETOS UTILITIES

To access the Utilities Menu, select Utilities from Flight Screen menu bar. The following screen will be displayed:

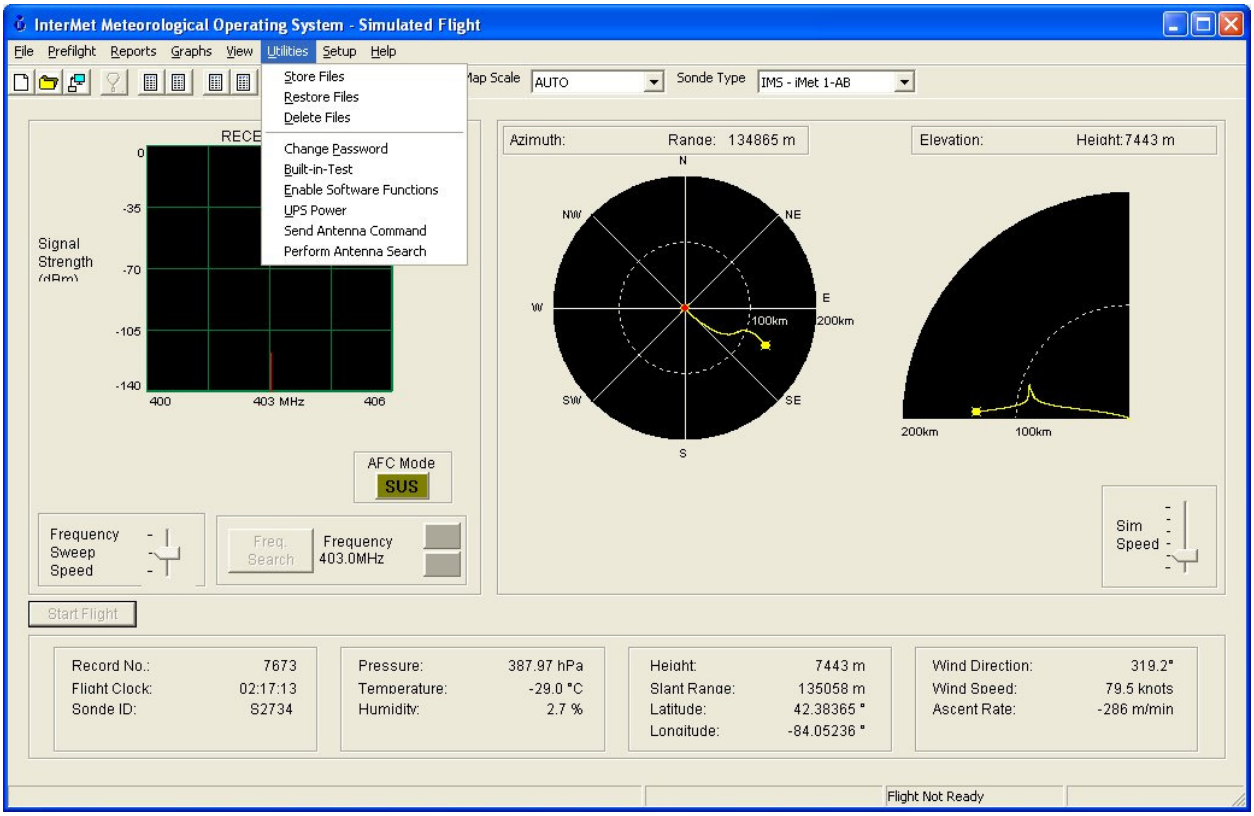


Figure 5-1: Utilities

5.1 STORE FILES

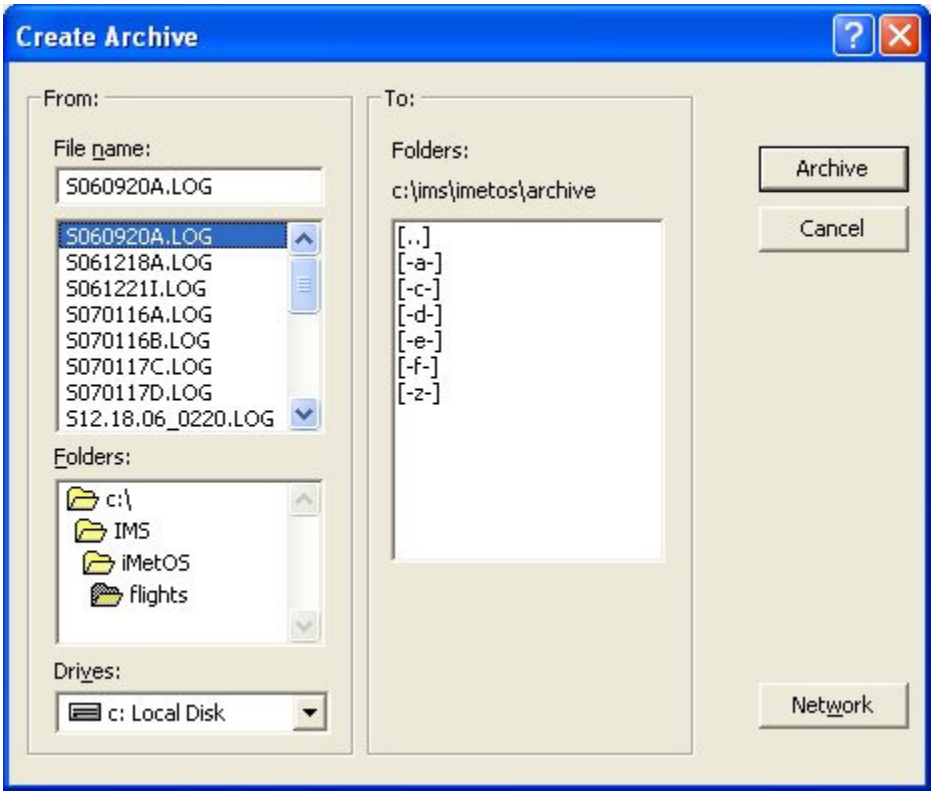


Figure 5-2: Data Storage Archives

The Store Files (Create Archive) screen appears above when the Store Files menu item is selected from the Utilities menu.

An archive contains the necessary files to simulate a flight as well as any reports generated in a compressed format. A 1.5 hour flight would normally take about 1.5 megabytes to store all files separately, but in an archive, generally only takes 400-500 kilobytes.

The Create Archive window is broken up into two areas: a FROM area and a TO area.

Use the FROM area to choose a FROM directory and a log file. Double click on directories to change directories. Single-click the flight log file to select it. By default, flight files are located in the C:\IMS\iMetOS\Flights directory.

Use the TO area to navigate to a directory to place the archived (zipped) file. Notice that the path is given above the TO folders area. Click the [Archive] button to create the archive. For uniformity, it is recommended that the archived files be placed in the C:\IMS\iMetOS\Archives directory.

5.2 RESTORE FILES

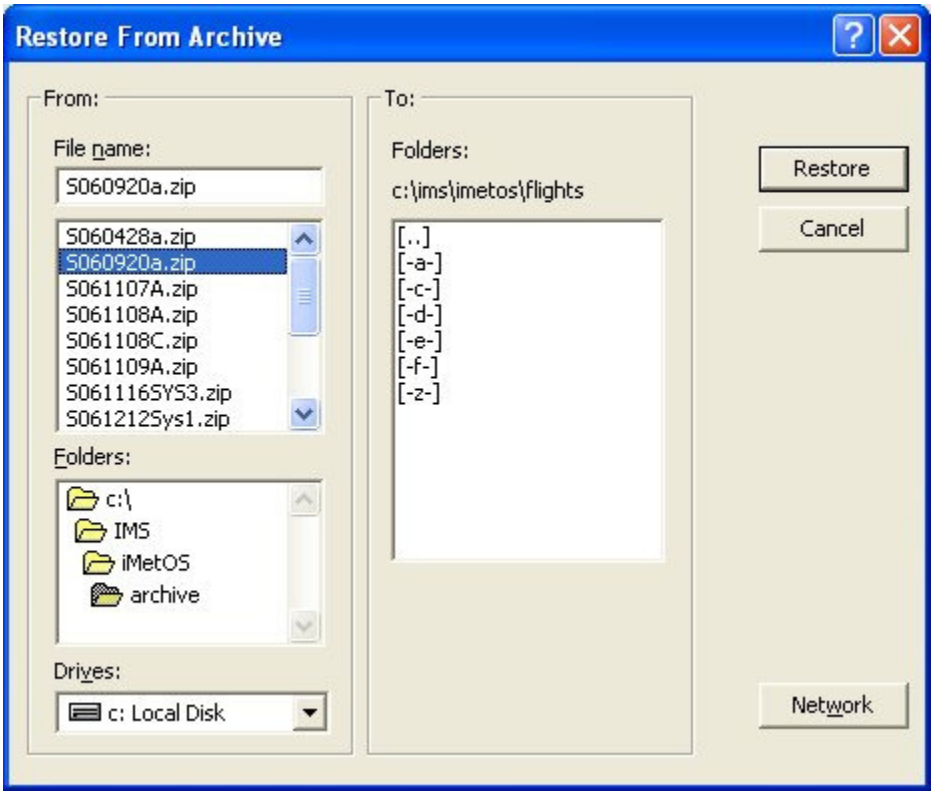


Figure 5-3: File Restoration from Archives

The Restore from Archive function takes an archive and decompresses (restores) the files contained within.

The Restore from Archive window is broken up into two areas: a FROM area and a TO area.

Use the FROM area to choose a FROM directory and an archive file. Double click on directories to change directories. Single-click the archive to select it. Generally, archives are located in the C:\IMS\iMetOS\Archives directory.

Use the TO area to navigate to a directory to place the flight files and reports. Notice that the path is given above the TO folders area. Click the [Restore] button to restore the files. Any files in the directory with the same name will be overwritten. To use the files immediately, restore them to the C:\IMS\iMetOS\Flights directory.

5.3 DELETE FILES

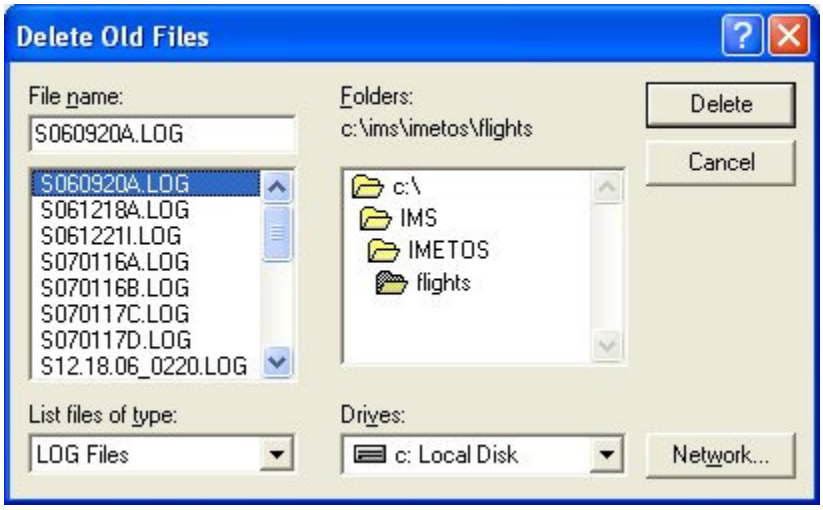


Figure 5-4: Deleting Files

For irretrievable deletion of previously recorded flights from hard disk, select Delete Files from Utilities menu. Navigate to the directory by double clicking the directory name in the Folders section. Single-click the flight to be deleted and press [Delete]. Double-clicking a file will immediately delete it.

CAUTION

Deleting the files is **permanent**. Files are not stored in the Recycle Bin for later restoring. InterMet recommends the delete function be used *only immediately after* the Store Files function has been used to archive the flight in the Archives directory.

CAUTION

If the flight archive (zip file) is located in the same directory, it will be deleted too, causing a complete loss of the flight data.

5.4 ENABLE SOFTWARE FUNCTION

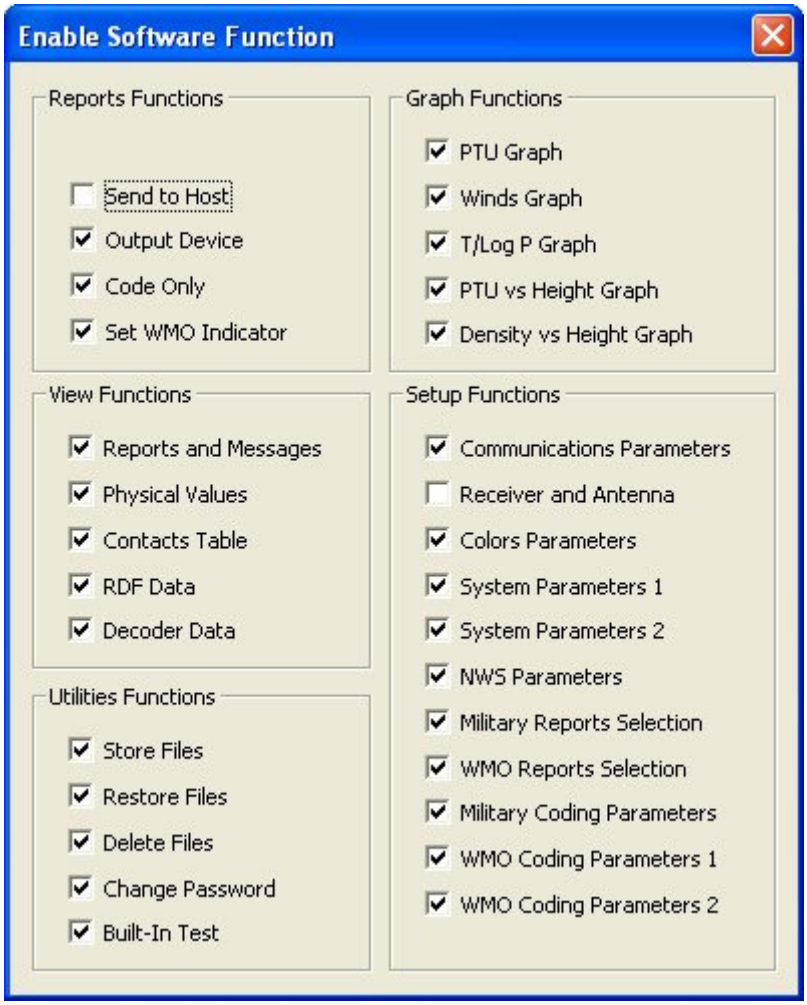


Figure 5-5: Enable Software Function

The Enable Software Function allows the user to configure which items appear in the iMetOS menus. To enable a function in the menu, place a check mark by the function. To disable a function, uncheck the item. Close the window to accept any changes.

CHAPTER 6
IMETOS SETUP

The System Setup menu is accessed from the Flight Screen:

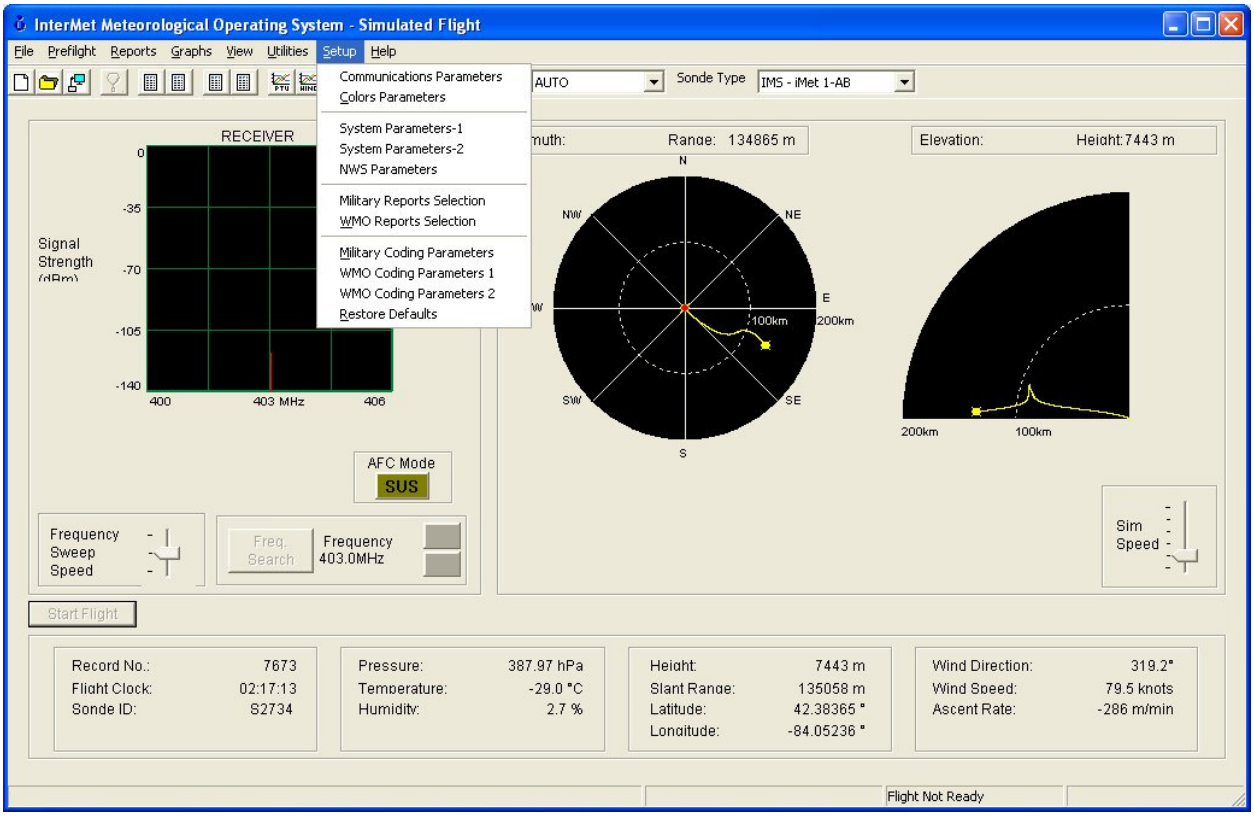


Figure 6-1: System Setup

The setup menu allows the user to change operating parameters of the iMetOS. Details of each menu item are given in this chapter.

6.1 COMMUNICATIONS PARAMETERS

Figure 6-2: Communications Parameters

This setting affects the MetServer application, which handles all communications between the CPU and the peripherals such as the ASOS (if provided) and 403 Receiver. Configuring it as a "Local Server" disables the IP address selection. The MetServer communicates with the external devices on the Computer Workstation.

When the MetServer is not configured as a local server, the IP address selection is enabled. Type in a valid IP address of a computer that is running the iMetOS as a local server. The MetServer application enables TCP/IP communication with the host computer running the iMetOS. The client can then interface with the host's peripherals as if they were its own.

6.2 DISPLAY COLOR PARAMETERS

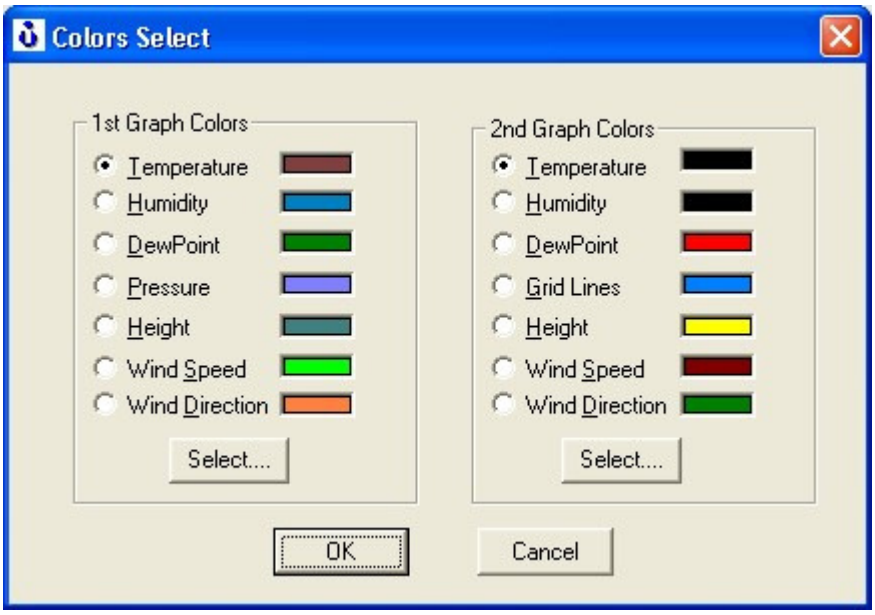


Figure 6-3: Color Parameters

It is recommended to accept the default color selections set at the factory, by clicking [OK].

To change any graph color, click on the desired parameter, then press [Select] under the respective graph list. The pane in Figure 6-4 will appear showing the available colors. Click on the desired color and press [OK]. The new color will appear instead of the old color next to the desired parameter. Press [OK] to accept or [Cancel] to reject any changes.

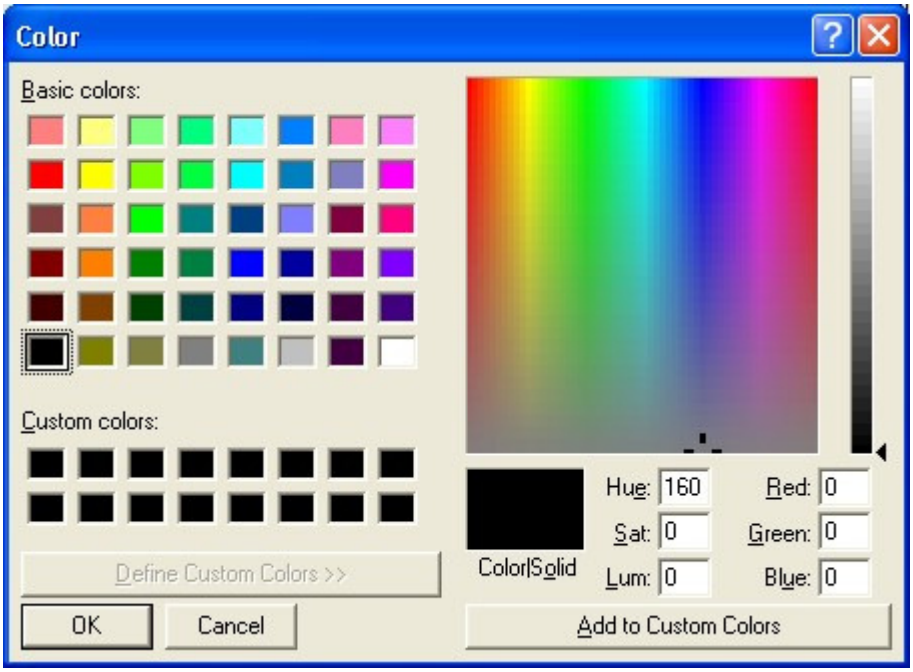


Figure 6-4: Color Selection

6.3 SYSTEM PARAMETERS I

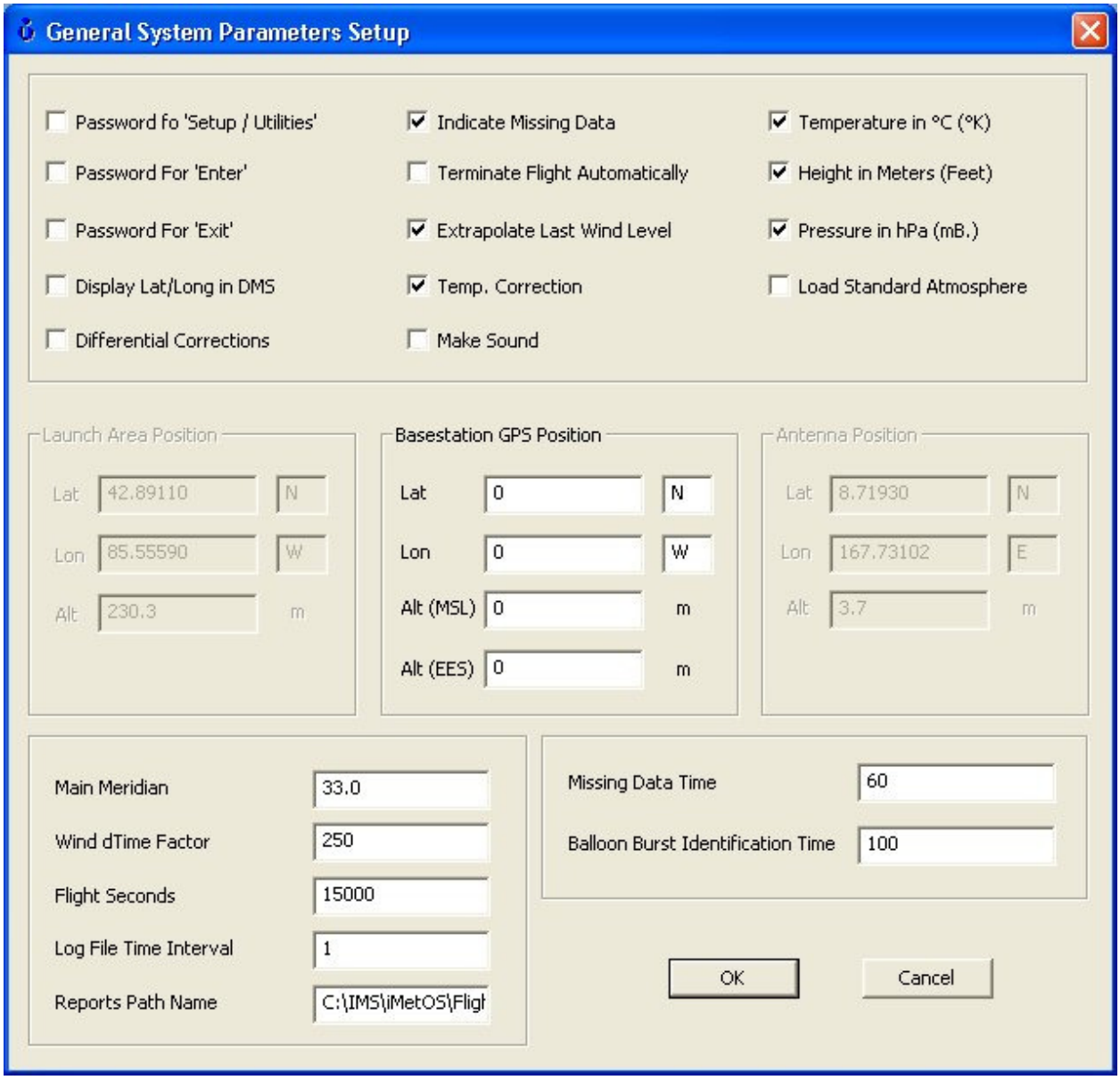


Figure 6-5: System Parameters 1

Default parameters are shown in Figure 6-5. Click [OK] to accept any changes or [Cancel] to reject any changes.

CAUTION

If password use is selected, entrance to system will be denied the next time software is accessed unless password is correctly entered.

- Password for Enter: requires a user password for setup windows.
- Password for Exit: requires the operator to enter a password to exit the iMetOS, to help prevent

accidental closure during a flight.

- Display Lat/Long in DMS: check to display latitude and longitude in degrees, minutes, and seconds
- Differential Corrections: enables differential corrections to be performed on the radiosonde GPS data when a basestation GPS receiver is available
- Terminate Flight Automatically: set to end logging automatically after an event signaling the end of a flight, such as a balloon burst.
- Extrapolate Last Wind Level: set to extrapolate the final wind level at the flight apex.
- Temperature Correction: set to use a solar correction.
- Temperature in °C (K): set to display temperatures in degrees Celsius (uncheck to display in Kelvin).
- Height in Meters: set to display height in meters (uncheck to display in feet)
- Load Standard Atmosphere: draws standard atmosphere lines on graphs.
- SPS GPS Position: the (preferably surveyed) position of the basestation GPS antenna used as a basis for the differential corrections

CAUTION

Do not change the following parameters. These are set at the factory for optimal performance.

- Main Meridian: enter only if UTM network use has been selected.
- Wind dTime Factor: an integration time factor for RDF (radio direction finding) wind computation.
- Flight Seconds: the maximum possible length of flight in seconds. This sets aside memory for storing data. If the time is too short, data may be unreliable.
- Log File Time Interval: the time interval for logging data record, in seconds.
- Flight Files Directory: the directory where all reports and flight data will be logged.
- Missing data time: amount of missing data to be allowed prior to marking missing data in coded messages.

CAUTION

InterMet highly recommends that the default value not be changed. Changing this value will result in changes in smoothed data. This value is optimized for this system.

- Balloon burst identification time: the amount of time the balloon must be continually descending before iMetOS identifies a balloon burst. The default value has been optimized for this system.

6.4 SYSTEM PARAMETERS II

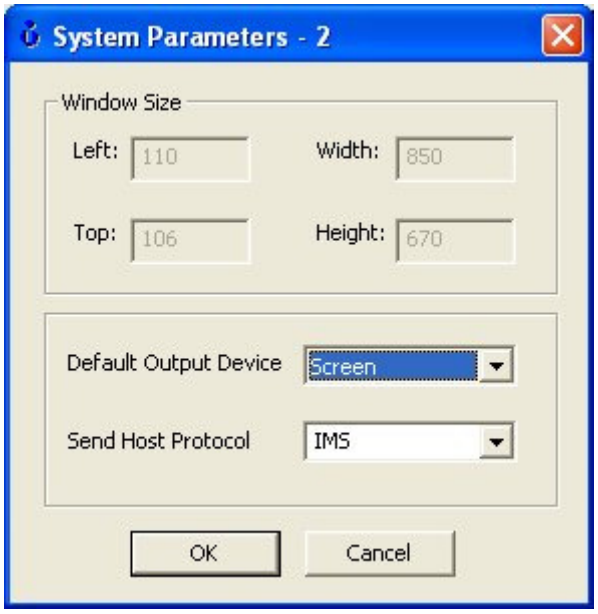


Figure 6-6: System Parameters 2

To make any changes, either type in a new numerical value or select a new item from the pull down menus. Click [OK] to accept any changes or [Cancel] to reject any changes. For most users, the default settings need not be changed.

- Window Size:
  - Disabled: the iMetOS automatically remembers its last size and window position
- Default Output Device: set the default output device for reports
  - Printer: automatically prints the reports upon generation to the default printer in Windows
  - Screen: creates a report on disk and displays the reports on screen
  - File: creates a report on disk in the Flights directory
  - Comm Port: automatically sends the reports out over a COM port
  - Drive A: creates a report on disk on the A: drive
  - Drive B: creates a report on disk on the B: drive
- Send Host Protocol: the protocol used for sending a report out over a COM port

6.5 MILITARY REPORTS SELECTION

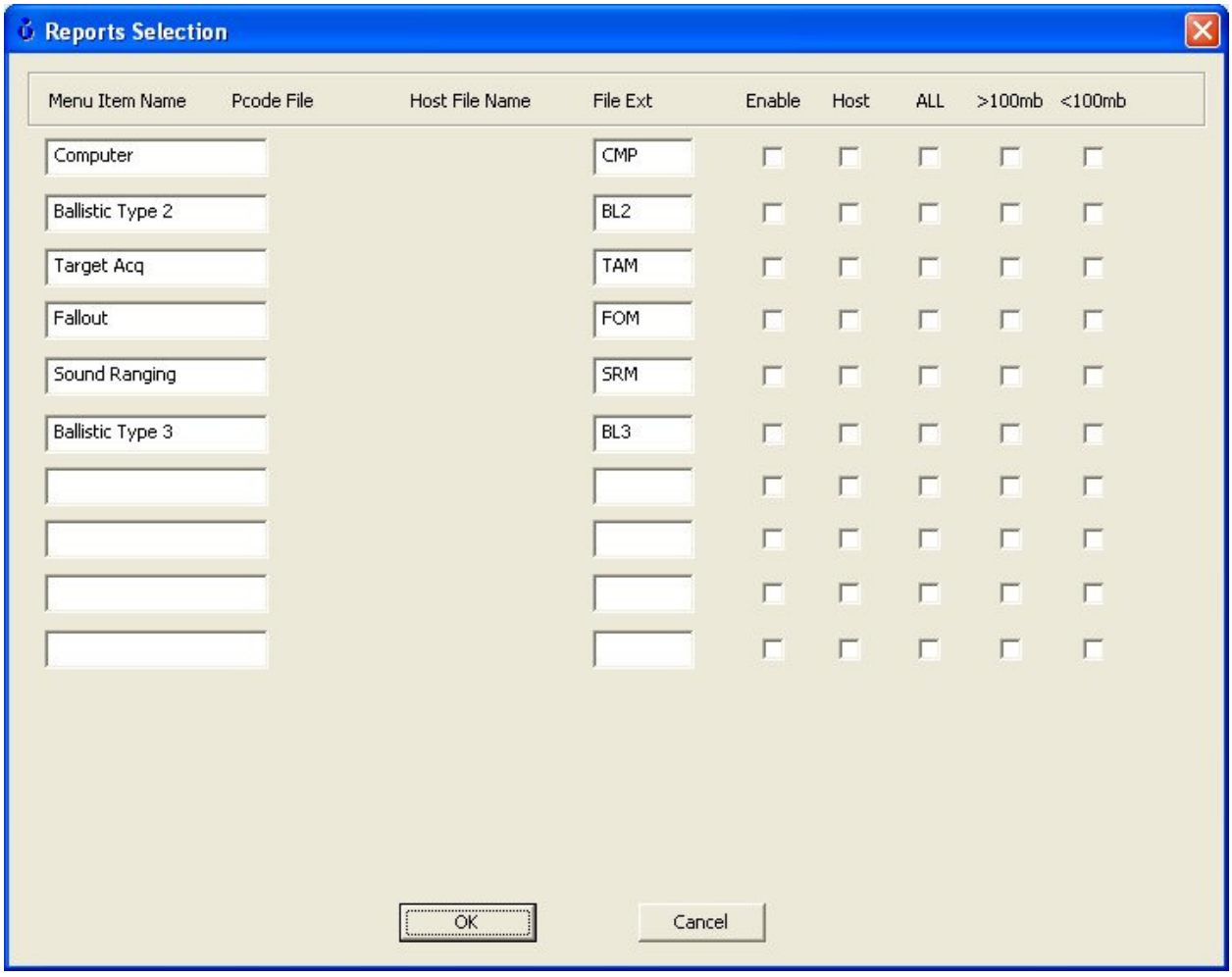


Figure 6-7: Military Reports

The fields appearing in this pane are as follows:

- Menu Item Name: the name of the actual report format, displayed in the Reports menu.
- PCODE File: the file used by the system to generate the respective report.
- Host File Name: the file name of the respective report when sent to Host.
- File Ext.: the extension of the file name under which the respective report is stored in the system.
- Enable: when checked, generation of this report type in system is enabled.
- Host: when checked, this report type is included in the "Send to Host" group.
- All: when checked, this report type is included in the "Create All Reports" group.
- >100mb: when checked, this report is generated after the flight crosses the 100 mbar level
- <100mb: when checked, this report is generated at flight termination

NOTE

Screen of actual system may show more or fewer report options. Enter as required and click [OK].

6.6 WMO REPORTS SELECTION

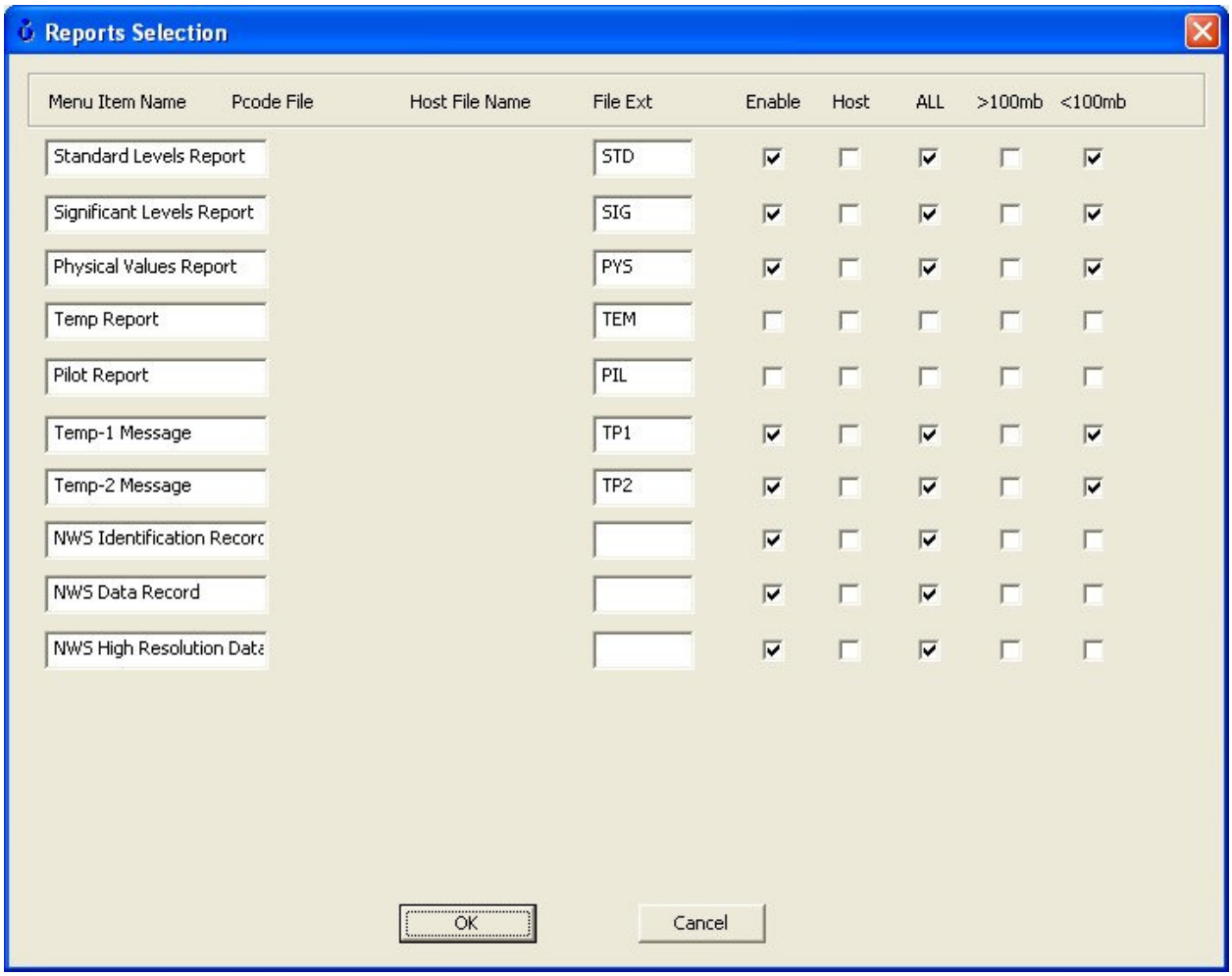


Figure 6-8: WMO Reports

For explanation of fields in this pane, see Section 6.5 above.

NOTE

Screen of actual system may show more or fewer report options. Enter as required and click [OK].

6.7 MILITARY CODING PARAMETERS

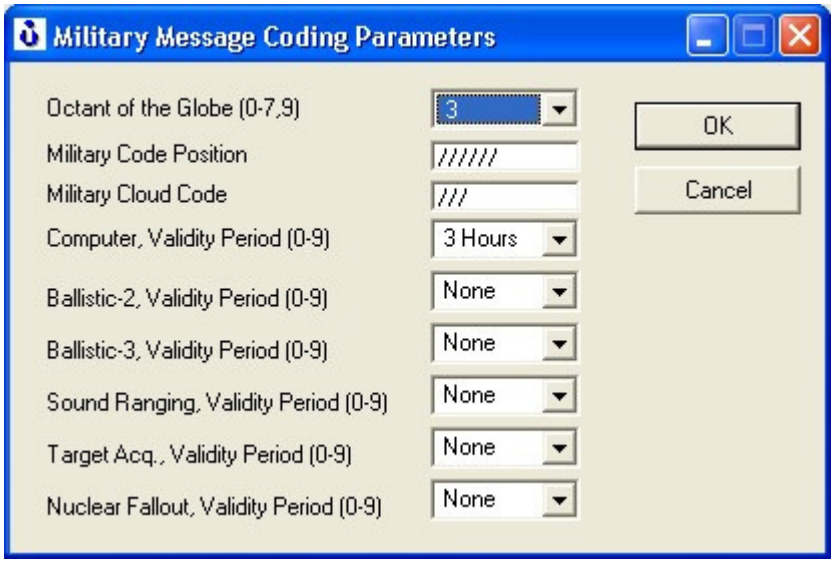


Figure 6-9: Military Message Coding Parameters

Enter as required and click [OK].

6.8 WMO CODING PARAMETERS I

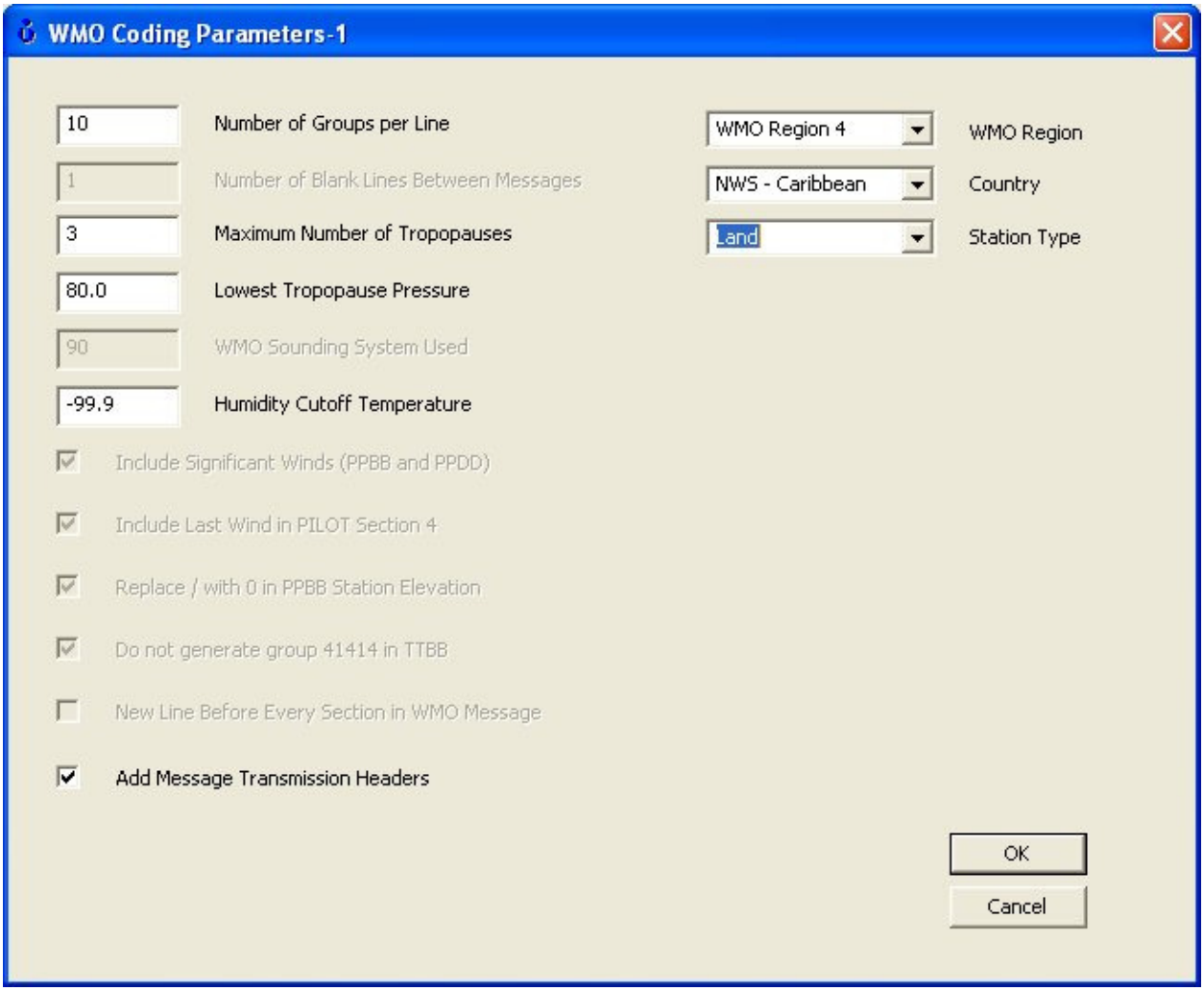


Figure 6-10: WMO Message Coding Parameters 1

Enter as required and click [OK].

Use the Station Type setting to switch between Land, Mobile (land), or Ship. This change affects the Temp Report, Pilot Report, Temp-1 Message, and Temp-2 Message only.

If the user has selected MOBILE or SHIP for the Station Type, use the Station Code in the PreFlight window (see section3.1.7.5) for part D…D of the TEMP message. Part D…D of the TEMP message is identified as the ship's call sign or an alphanumeric code that contains a two letter geographical designator and the first three letters of the name of the town.

6.9 WMO CODING PARAMETERS II

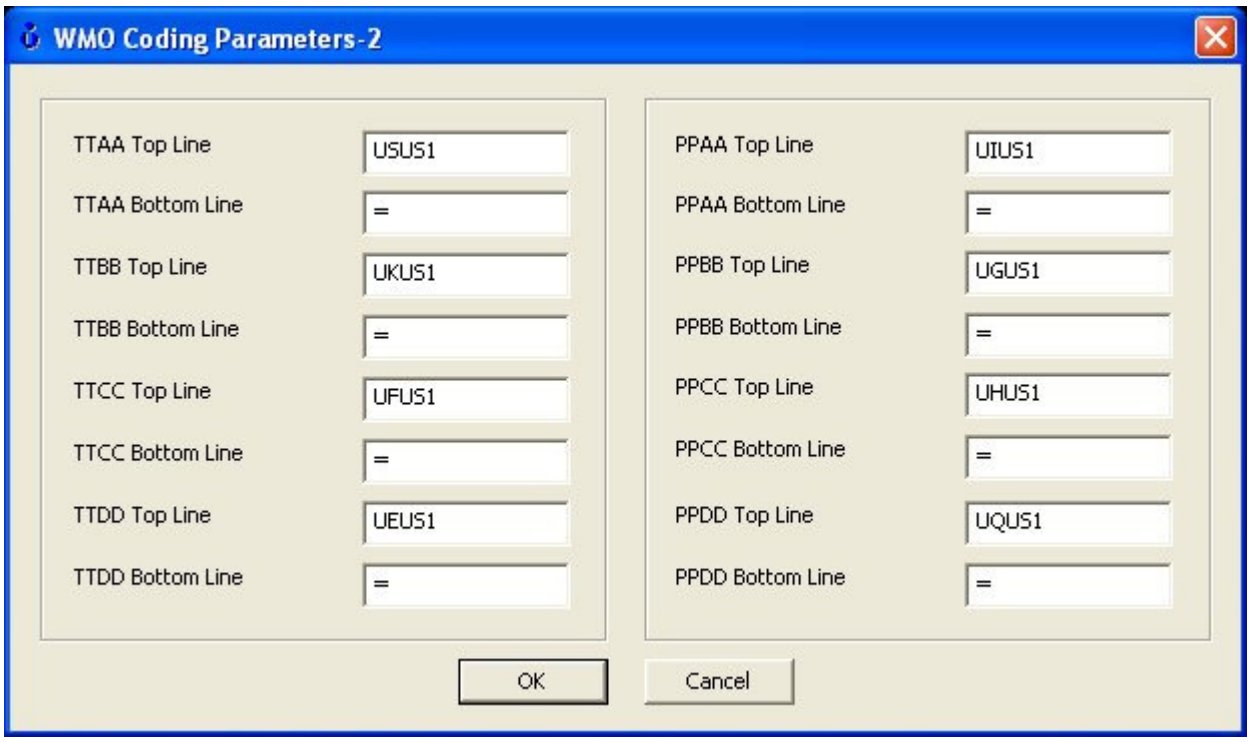


Figure 6-11: WMO Message Coding Parameters 2

The WMO coding parameters seen here affect the Temp Report, Pilot Report, Temp-1 Message, and Temp-2 message headers only. These headers are used if the report/message is sent to meteorological agencies. Enter as required and click [OK].

6.10 METSERVER CONFIGURATION

The MetServer configuration file is used to configure the MetServer application. It is located in the C:\IMS\iMetOS\MetServer directory. The file is set by default at the factory and should not be changed.

The MetServer can be configured through a GUI by right clicking on the MetServer (iMetOS Communications) icon on the taskbar and selecting settings.

The user must set the MetServer to use the proper COM port for the radiosonde decoder. First, select "Bell202Decoder 1200" under the Device and Speed section. Then, select the COM port under the COM port selection. The MetServer will only show the registered COM ports on the computer. See Section 7.3 to determine the COM port used by the decoder.

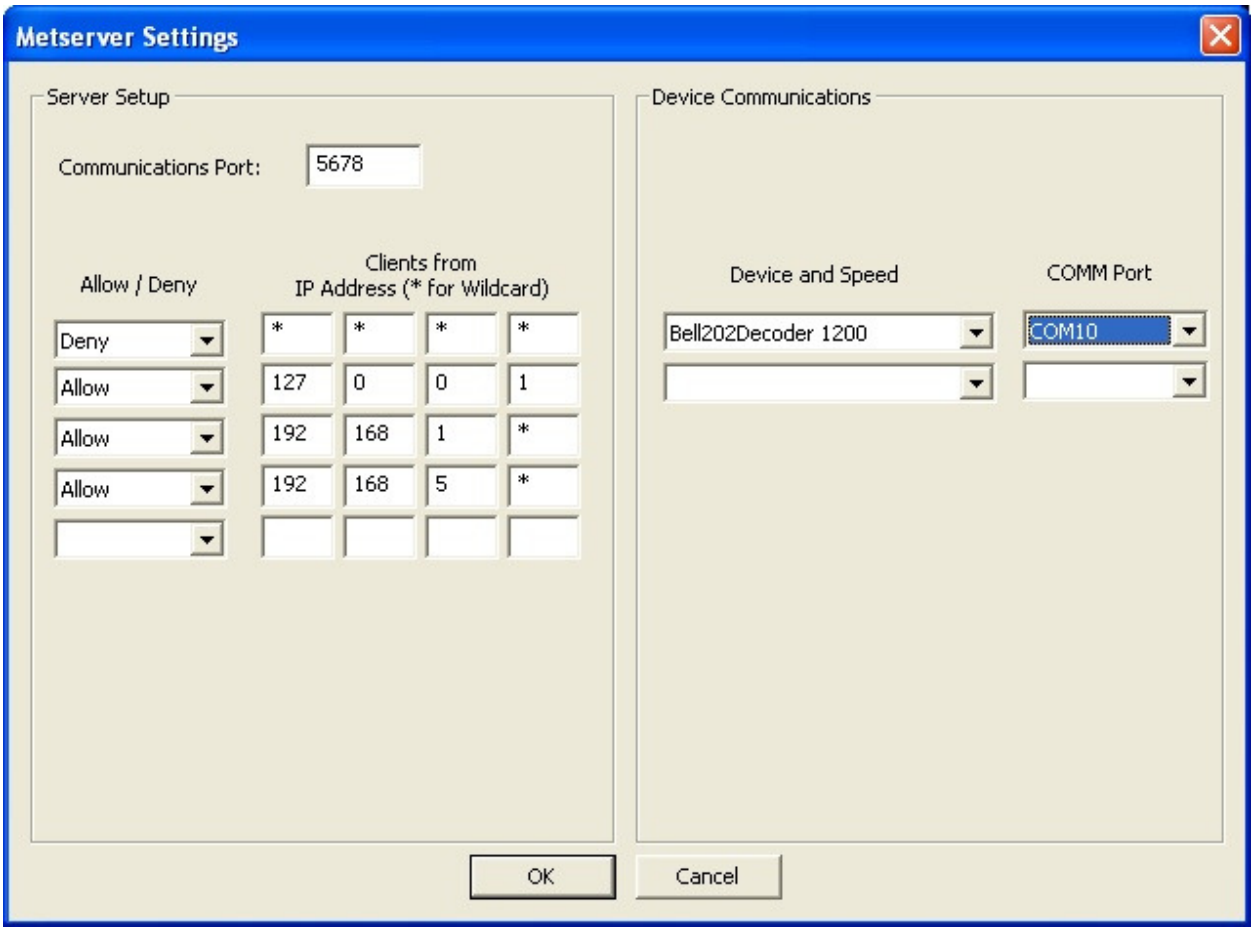


Figure 6-12: MetServer Settings

6.11 IMETOS CONFIGURATION FILES

The iMetOS uses three different configuration files to determine its setup, as defined in Table 6-1:

Table 6-1: iMetOS Configuration Files

File	Location	Use
iMetOS.cfg	C:\IMS\iMetOS	Remember iMetOS client settings, GPS information, Reports selection, window location & size, etc.
Defaults.cfg	C:\IMS\iMetOS	Keep default iMetOS client settings
MetServer.cfg	C:\IMS\iMetOS\MetServer	Remember device and COM port settings for the MetServer

The iMetOS.cfg file is read and written each time the iMetOS is ran, both in Real Flight mode and Simulated Flight mode. The MetServer.cfg file is read each time the iMetOS is ran in Real Flight mode, but is only written if the user makes any changes in the MetServer Settings window and presses [OK] to save the changes (Section 0).

The Defaults.cfg file is essentially a copy of the iMetOS.cfg file. It is only read if the user selects Setup | Restore Defaults from the iMetOS menubar. It is never written by the iMetOS. To set the defaults to the user's preferences, the user must delete the Defaults.cfg file, copy the iMetOS.cfg file to the Defaults.cfg

file.

6.12 AUTOMATIC SETTING OF SYSTEM COMPUTER CLOCK

The iMetOS is configured such that it can set the system computer's clock to UTC time if a GPS basestation provides GPS time. This setting is only available by editing the iMetOS.cfg file found in the C:\IMS\iMetOS directory.

The parameter `set_time_from_gps:` is used to determine whether iMetOS should set the system computer's time automatically. To have iMetOS set the clock automatically, change the value to 1. If iMetOS should not set the clock, change the value to 0. This is not configurable via the iMetOS menus.

A short section of the iMetOS.cfg file is listed below:

```
cfg_station_latitude: 42.891068
cfg_station_longitude:-85.555939
cfg_station_height:   229.164993
set_time_from_gps:    0
gps_time_utc_offset:  14
cfg_diff_correction:  1
```

CHAPTER 7
INSTALLING/UPGRADING IMETOS AND DRIVERS

7.1 INTRODUCTION

InterMet Systems may occasionally release a new version of iMetOS. In this case it is necessary to upgrade the iMetOS. It may also become necessary to re-install a copy of the iMetOS if the existing version is damaged or corrupted.

7.2 IMETOS

iMetOS uses an installer for installation. The installer can also be used to uninstall the iMetOS. The installer places install and uninstall information in the Windows "Add or Remove Programs" icon in the Control Panel.

To install a new version of iMetOS from scratch, see Section 7.2.1. To upgrade the iMetOS, follow the instructions in Section 7.2.2 before installing the new version of iMetOS as in Section 7.2.3.

7.2.1 Installing iMetOS for the First Time

To install iMetOS for the first time, perform the following steps:

l. Open Windows Explorer and navigate to the directory containing the installer (USB Disk, CD-ROM, or a network location).

m. Execute the installer (setup.exe).

n. Follow the installer's prompts. The installer will automatically install the iMetOS to the C:\IMS\iMetOS directory.

o. Open iMetOS from the desktop icon or from the Start | InterMet Systems | iMetOS menu.

p. Select [Real Flight].

q. On the Windows taskbar, right click on the MetServer icon and select Settings.

r. Select "Bell202Decoder 1200" under the Device and Speed section.

s. Determine the COM port used by the decoder. See Section 7.3.1 to determine the COM port.

t. Select the decoder COM port under the COM port selection. The MetServer will only show the registered COM ports on the computer.

u. Press the [OK] button to save the settings.

v. Return to the iMetOS client.

w. Select the IMS – iMet-1-AA or IMS – iMet-1-AB radiosonde type from the radiosonde type pulldown (see Section 4.4.2.11). The radiosonde model is printed on the frequency selection label on the radiosonde.

x. Close iMetOS.

7.2.2 Uninstalling the iMetOS

When uninstalling the iMetOS, it is wise to make a backup copy of the configuration files. To backup these files and uninstall iMetOS, perform the following steps:

a. Copy the iMetOS.cfg and Defaults.cfg files from the C:\IMS\iMetOS directory to a temporary directory (i.e. C:\Temp).

b. Copy the MetServer.cfg file from the C:\IMS\iMetOS\MetServer directory to the same temporary directory as in step a.

c. Open the Windows Control Panel.

d. Open the "Add or Remove Programs" control panel.

e. Select the iMetOS in the programs list. Click [Remove].

f. Follow the uninstaller's prompts. Files not generated by the installer (i.e. flights, archives, and radiosonde calibration data) will not be deleted from the C:\IMS\iMetOS directory.

g. If the iMetOS shortcut icons were moved to a location other than their default installation location, the icons may not delete automatically. The user must delete them in order to complete the removal of the iMetOS.

7.2.3 Re-Installing the iMetOS

If the iMetOS is being upgraded to a newer version, it is wise to have a backup copy of the configuration files. The old iMetOS must be uninstalled first. Perform the uninstall instructions in Section 7.2.1 prior to installing the new version of the iMetOS. To install the iMetOS, perform the following steps:

a. Open Windows Explorer and navigate to the directory containing the installer (USB Disk, CD-ROM, or a network location).

b. Execute the installer.

c. Follow the installer's prompts. The installer will automatically install the iMetOS to the C:\IMS\iMetOS directory.

d. If upgrading the iMetOS, copy the configuration files (unless otherwise instructed by specific instructions accompanying the iMetOS) back into their respective directories:
iMetOS.cfg and Defaults.cfg in C:\IMS\iMetOS
MetServer.cfg in C:\IMS\iMetOS\MetServer

7.3 DECODER DRIVER & CONFIGURATION

The decoder uses an FTDI USB chip to communicate with the system computer. Windows XP and Vista have drivers built-in; therefore it does not require a separate driver. To install and configure the decoder, perform the following steps:

a. Unplug the audio cable from the decoder, if plugged in.

b. Plug the USB cable into the decoder. Plug the other end of the USB cable into an available USB port and wait for Windows to detect the hardware.

c. Allow Windows to install the drivers automatically and ignore the warning about the driver not being digitally signed.

7.3.1 Decoder Configuration

To determine the COM port used by the decoder, follow these steps for Windows XP:

a. Go to the Start Menu | Control Panel.

b. Open System.

c. Select the [Hardware] tab and hit the [Device Manager] button.

d. Expand the Ports (COM & LPT) group.

e. The decoder will be listed as USB Serial Port (COM*x*).

To determine the COM port used by the decoder, follow these steps for Windows Vista:

f. Go to the Start Menu | Settings.

g. Open the Device Manager.

h. Expand the Ports (COM & LPT) group.

i. The decoder will be listed as USB Serial Port (COM*x*).

7.4 JUMPING MOUSE SOLUTION

In the event that the decoder is plugged into the computer after it is connected to an active receiver, the mouse on the computer may act up. If this is the case, unplug the decoder from the receiver and computer.

In certain instances, Windows will erroneously detect a serial mouse on the COM port required for communication with the iMet-3150. Follow these steps to prevent this from happening again:

a. Reconnect the Decoder to the System Computer with the USB cable. Do **not** connect the audio cable.

b. Go to the Start Menu | Control Panel.

c. Open System.

d. Select the [Hardware] tab and hit the [Device Manager] button.

e. Expand the Ports (COM & LPT) group.

f. Right click on the USB Serial Port (COM*x*) and select Properties.

g. Open the [Details] tab and select "Device Instance Id" in the pulldown menu.

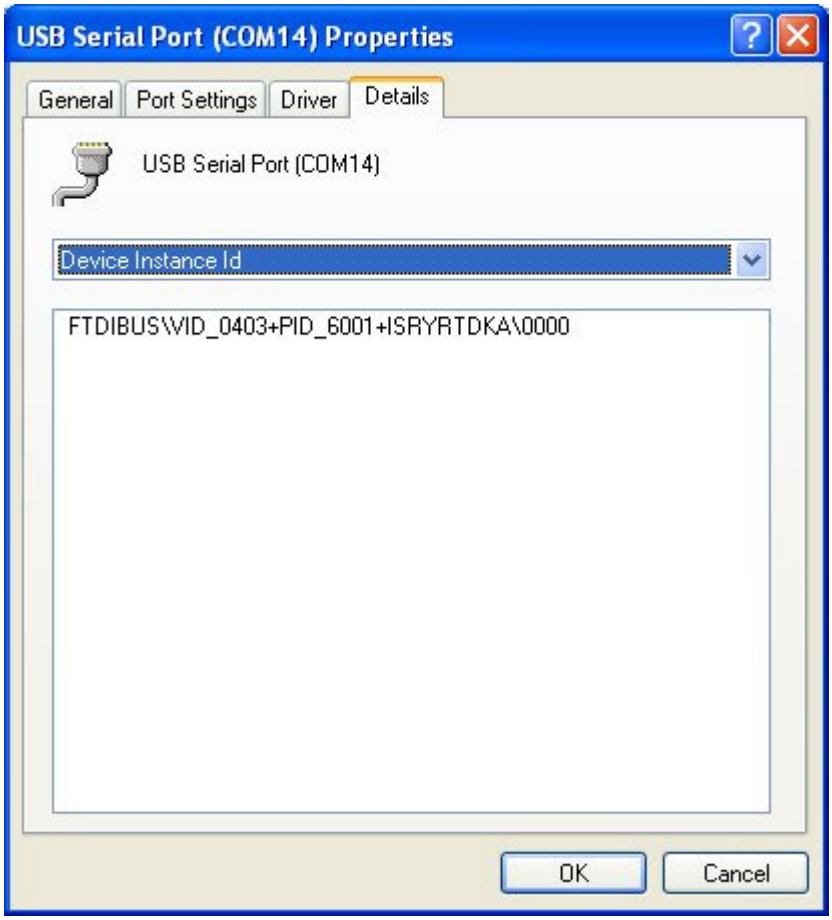


Figure 7-1: Device Instance Id

h. Make a note of the text in the lower box. The text reads of the form ***Enumerator* \ *DeviceID* \ *InstanceID*.**

Table 7-1: COM Port Registry Parameters

Enumerator	DeviceID	InstanceID
FTDIBUS		0000

i. Hit [Cancel].

j. Click [OK] to close the USB Serial Port properties.

k. Close the Device Manager window.

l. Click [OK] to close the System Properties window.

m. From the Start | Run menu, type "regedit" and click OK to start the Registry Editor.

n. Browse to **HKEY_LOCAL_MACHINE \ System \ CurrentControlSet \ Enum \ *Enumerator* \ *DeviceID* \ *InstanceID* \ Device Parameters** where *Enumerator*, *DeviceID*, and *InstanceID* are given by Table 7-1 above in step h.

o. Go to Edit | New | DWORD Value.

p. Type in the name "SkipEnumerations" for the value name.

NOTE

The value name is case sensitive. Type "SkipEnumerations" exactly as shown, without the quotation marks.

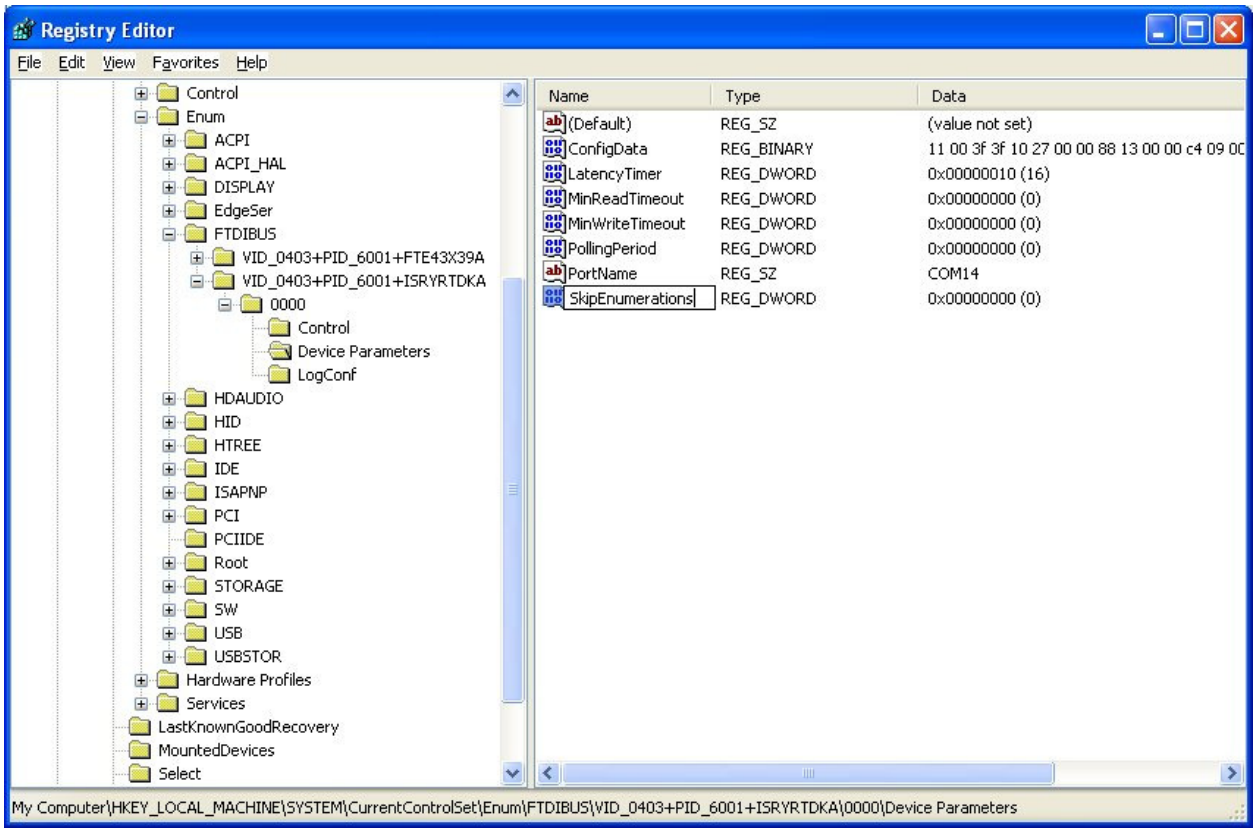


Figure 7-2: Enter Value Name

q. Hit [Enter] or double-click to edit the DWORD value.

r. Type "FFFFFFFE" and select the Hexadecimal base, as shown in Figure 7-3. Note that this is not case sensitive.

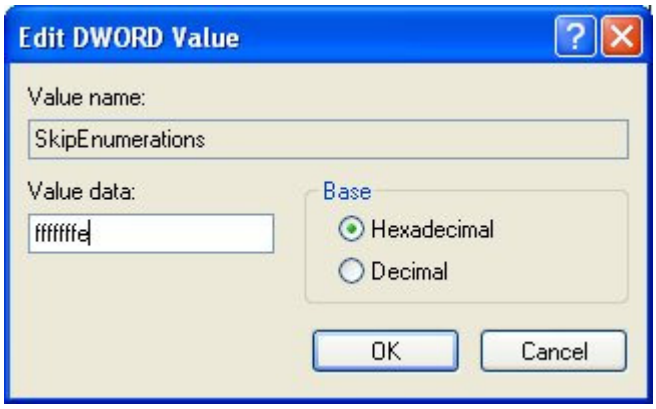


Figure 7-3: Enter DWORD Value

s. Hit [Enter] or click [OK].

t. Close Registry Editor.

u. Reboot the computer.

At this point, the computer's mouse should never inexplicably jump all over the screen. If it does, please contact InterMet Support as defined in CHAPTER 10.

CHAPTER 8
BALLOON INFLATION KIT

The Balloon Inflation Kit is an optional accessory to the iMet-3150. The inflation kit is designed to give a user a consistent and easy means of measuring the amount of lift for helium filled balloons. It eliminates the guesswork out of trying to fill a weather balloon by hand. It works best when the balloon is sheltered from the wind.

The inflation kit fits in a single Pelican 1550 Case (same size as the iMet-3150 case).

Radiosondes and balloons are designed to rise at a rate of 300 meters per minute, or 5 meters per second. Different weather conditions and payload mean that a different amount of lifting gas may be required each time a balloon is inflated. Using the inflation kit simplifies the process of filling.

The inflation kit includes a regulator (with CGA 580 input to fit helium tanks within the United States) with adjustable output, automatic shut-off valve, 1750 grams of weights, and 15 feet of hose from the regulator to the shut-off valve.

In October 2010, the Balloon Inflation Kit underwent a revision. A roller was added to the vertical valve control arm in an effort to reduce the amount of friction when the balloon lifts the weight lever arm. Users of this new inflation kit (p/n 100,438) do not need to use grease to lube the vertical valve control arm.

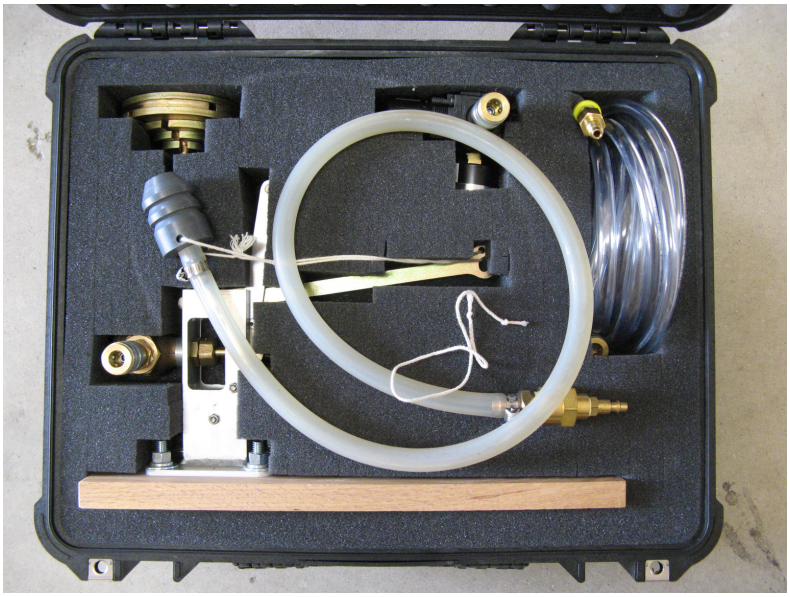


Figure 8-1: Stored Balloon Inflation Kit

To use the balloon inflation kit, perform the following steps (refer to Figure 8-1, Figure 8-2, Figure 8-3, and Figure 8-4):

a. Remove the inflation kit from the transportation case.

b. Connect the balloon nozzle and hose (1) to the output side of the shut-off valve.

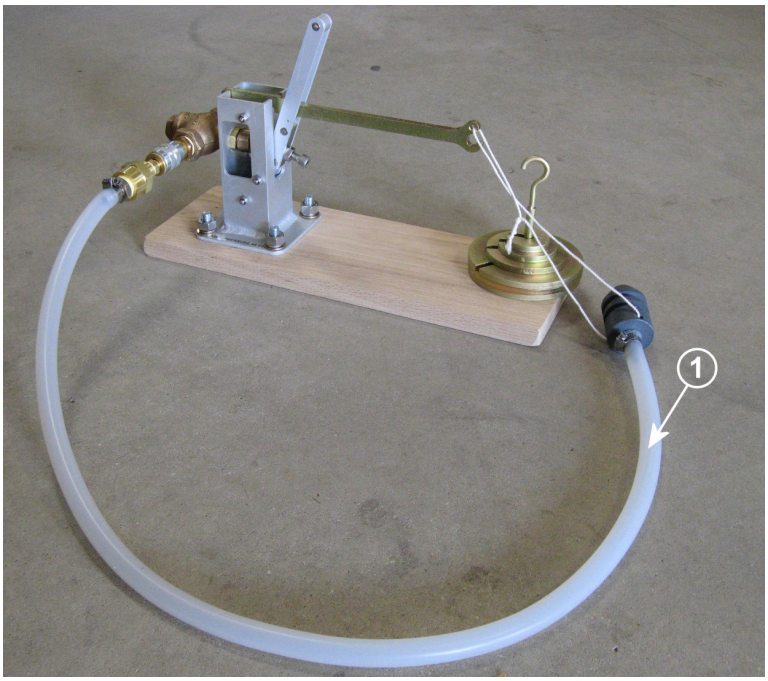


Figure 8-2: Attach nozzle to the shut-off valve

c. Connect the input hose (2) to the input side of the shut-off valve.

d. Connect the regulator assembly to the helium tank, then connect the input hose to the output of the regulator.

CAUTION

Do not exceed 45 PSI output pressure.

Figure 8-3: Regulator and input hose attached

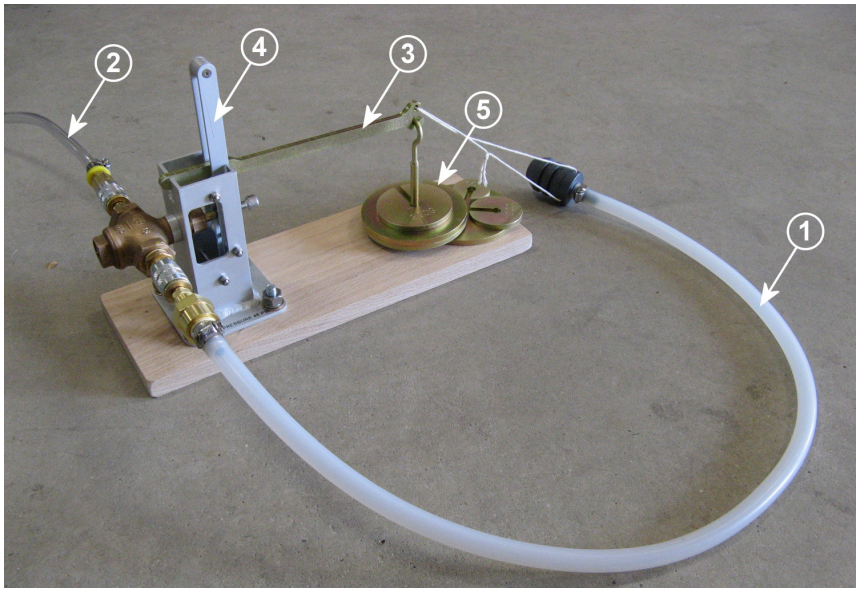


Figure 8-4: Ready for inflation

e. Lift the weight lever arm (3).

NOTE

Users of the older inflation kit (p/n 100,433) without the roller must apply a small amount of grease where the vertical valve control arm (4) meets the weight lever arm.

f. Pull back on the vertical valve control arm (4) and allow the weight lever arm to fall.

g. Select the amount of weight (5) appropriate for the flight. Options include parachutes, pibal lights, and de-reelers.

$$1000\,gm + Radiosonde_{Mass} + Options + Conditions = ?$$

Table 8-1: Radiosonde Mass, Options, and Conditions

Condition/Option	**Weight**
iMet-1 Radiosonde	260 gm
Parachute	≈70 gm
De-Reeler	≈50 gm
Rain	
Light	Add 100 gm
Moderate	Add 200 gm
Heavy	Add 300 gm

Condition/Option	Weight
Icing	
Moderate	Add 300 gm
Severe	Add 500 gm
High Surface Wind	
>25 kts (>12.5 m/s)	Add 100 gm
>40 kts (>20.5 m/s)	Add 200-300 gm

h. If used outdoors, orient the inflation kit such that the weight lever arm points downwind. This will minimize any upward or side-to-side pulling of the weight lever arm by the partially inflated balloon.

i. Attach the balloon to the nozzle and begin inflation by opening the gas valve on the tank. Adjust the output pressure to 10-12 PSI and lock adjusting knob. Attach the balloon to the nozzle and begin inflation by opening the gas valve on the tank. Adjust the output pressure to 10-12 PSI and lock adjusting knob.

NOTE

If used outdoors, wind may cause the weights to be lifted, stopping inflation prematurely.

j. Once the balloon reaches the appropriate lift, the balloon will lift the weight lever arm, shutting off the gas supply to the balloon.

k. Close the gas valve on the tank. Briefly pull back the vertical valve control arm (4) to relieve the pressure in the inflation system.

NOTE

Do not use the shut-off valve to close the gas supply. The tank's gas valve is the only valve designed to prevent gas from leaking.

l. Tie off the balloon and remove the nozzle from the balloon. The balloon is now ready for flight.

CHAPTER 9
CONTACTING AIR TRAFFIC CONTROL

One of the applications of the iMet-3150 is use for storm chasing or other field work. Many users of the iMet-3150 do not have the benefit of a constant launch location, with defined procedures for contacting a nearby Air Traffic Control Tower (ATCT) prior to balloon release. This chapter strives to give the user a means of finding out whether or not the iMet-3150 has been set up near an airport such that Air Traffic Control (ATC) should be contacted prior to balloon release.

Different countries have different requirements for weather balloon launches. This chapter applies to users within the United States only.

9.1 FEDERAL AVIATION REGULATIONS

> 14 CFR 101
>
> § 101.1 Applicability.
>
> (a) This part prescribes rules governing the operation in the United States, of the following:
>
> ...
>
> (4) Except as provided for in §101.7, any unmanned free balloon that—
>
> (i) Carries a payload package that weighs more than four pounds and has a weight/size ratio of more than three ounces per square inch on any surface of the package, determined by dividing the total weight in ounces of the payload package by the area in square inches of its smallest surface;
>
> (ii) Carries a payload package that weighs more than six pounds;
>
> (iii) Carries a payload, of two or more packages, that weighs more than 12 pounds; or
>
> (iv) Uses a rope or other device for suspension of the payload that requires an impact force of more than 50 pounds to separate the suspended payload from the balloon.
>
> (b) For the purposes of this part, a gyroglider attached to a vehicle on the surface of the earth is considered to be a kite.

To the user of the iMet-3150, this means that:

- the balloon payload must weigh less than 4 pounds
- the bottom side of the radiosonde must have a density of less than 3 oz per square inch (13.2 gm per square centimeter)
- the string must break with a force of less than 50 pounds

If the above conditions are met, then technically no official notice is required.

However, as a courtesy to the aviation community and to reduce risk of losing the radiosonde, especially if the user is under Class B, C, or D airspace, the user should call the airport's control tower to see if there is

any air traffic nearby and get clearance to launch a balloon.

If the user is under class E airspace to the surface, or even down to 700 ft (versus the normal 1200 ft), there may be a smaller airport nearby without a control tower. There it would probably be nice just to call the airport's FBO (fixed-base operator) to see if they know of any air traffic in the area.

9.2 AIRSPACE INFORMATION

The United States has six different types of airspace, listed by letter: Class A, Class B, Class C, Class D, Class E, and Class G. Airports are in five of those types of airspace: Class B, Class C, Class D, Class E, and Class G.

Airports with ATCT are Class B, Class C, or Class D only.

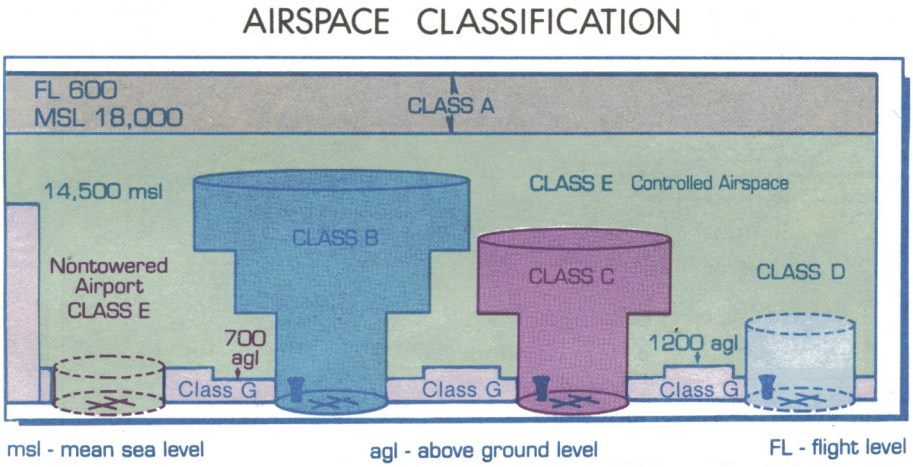


Figure 9-1: Airspace Classification

Figure 9-1 shows the different types of airspaces within the United States. Note the symbol of airport control towers in the Class B, Class C, and Class D airports. Class E and Class G airports are uncontrolled airports, so they will not have a control tower.

9.2.1 Class B Airspace

Class B airspace is usually found near major cities and denotes a major hub airport. ATC operates 24/7 at these airports. Examples of Class B airports include: ATL, BOS, DTW, EWR, HNL, IAH, JFK, LAX, LGA, MCO, MEM, MIA, MSP, ORD, PHL, SEA, and more.

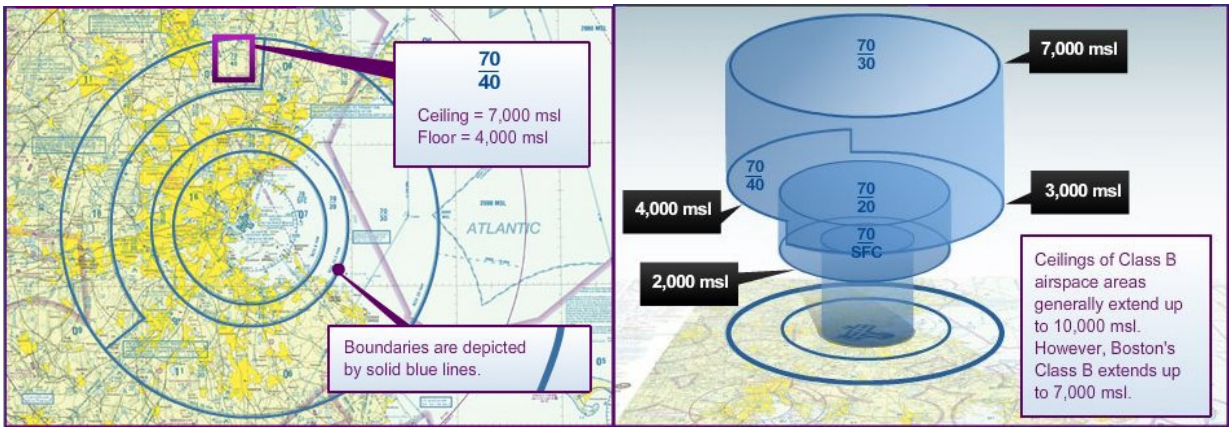


Figure 9-2: Class B Airspace

Class B airspace is denoted by solid blue lines on an aeronautical chart. The upside-down wedding cake can extend outwards to as many as 30 nm from the airport, but are shaped to the airport's requirements.

As a courtesy, if the user is set up under the Class B airspace, the user should contact the ATCT to obtain permission to launch.

9.2.2 Class C Airspace

Class C airspace is airspace for medium-sized airports. ATC operates only during the hours of operation of the airport. Examples of Class C airports include: ANC, BNA, ELP, FLL, GEG, GRR, MDW, OAK, RNO, SJU, SMF, and more.

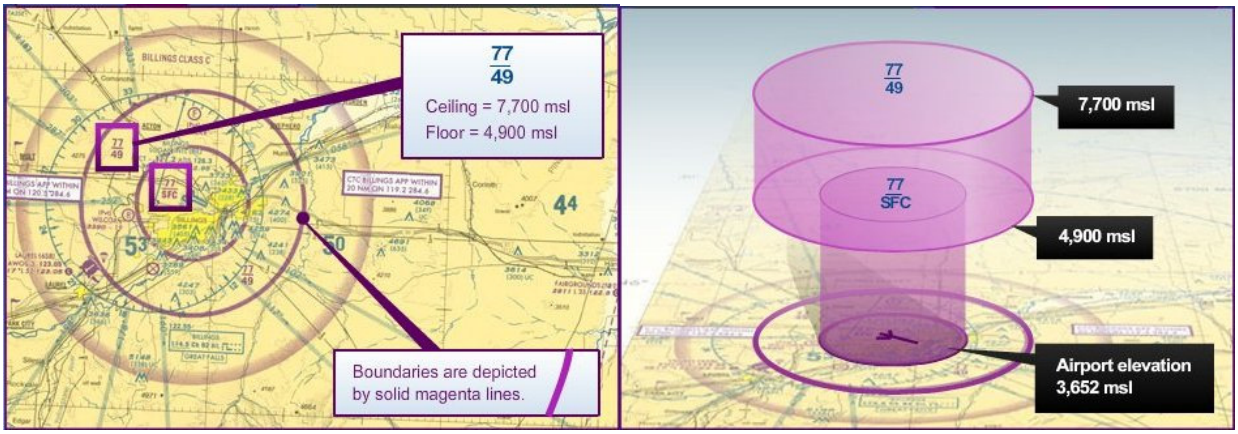


Figure 9-3: Class C Airspace

Class C airspace is denoted by solid magenta lines on an aeronautical chart. The upside-down wedding cake is smaller than that of a Class B airport. The inner circle extends to 5 nm from the airport, while the outer circle extends to 10 nm from the airport. Aircraft generally report to ATC within 20 nm of the airport.

As a courtesy, if the user is set up under the Class C airspace, the user should contact the ATCT to obtain permission to launch.

9.2.3 Class D Airspace

Class D airspace is airspace for smaller-sized airports. ATC operates only during the hours of operation of the airport. Examples of Class D airports include: ARB, BFI, FAI, FAR, ILM, LGB, MKG,MLB, SAW

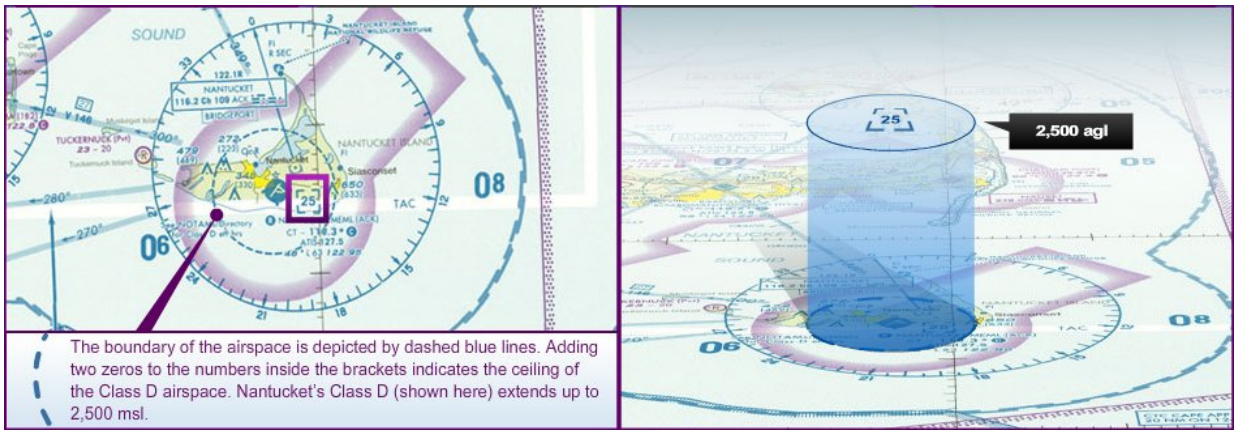

The boundary of the airspace is depicted by dashed blue lines. Adding two zeros to the numbers inside the brackets indicates the ceiling of the Class D airspace. Nantucket's Class D (shown here) extends up to 2,500 msl.
25
2,500 agl

Figure 9-4: Class D Airspace

Class D airspace is denoted by dashed blue lines on an aeronautical chart. The airspace is cylindrical in shape, extending to 5 statute miles from the airport. Aircraft generally report to ATC within 10 nm from the airport.

As a courtesy, if the user is set up in or near the Class D airspace, the user should contact the ATCT to obtain permission to launch.

9.2.4 Class E/G Airspace

Class E and Class G airports do not have an Air Traffic Control Tower. They are self-controlled airports, meaning pilots simply make radio calls on a Common Traffic Advisory Frequency (CTAF).

Class E airports are depicted by dashed magenta lines (generally at 5 statute miles radius), while Class G airports do not have any special markings.

Figure 9-5: Class E and G Airspace

Figure 9-5 shows examples of Class E and Class G airports. Pellston Regional (PLN) is Class E, while Charlevoix (CVX), Harbor Springs (MGN), Beaver Island (SJX) are Class G.

If the user is near a Class E or Class G airport, a call to a Fixed-Base Operator (FBO) at the airfield to let them know a launch will occur is a nice courtesy.

9.3 DETERMINING LOCATION RELATIVE TO AN AIRPORT

With the internet, it is very easy to determine whether or not the user lies under Class B, C, D, E, or G airspace. SkyVector (http://skyvector.com) is an excellent internet source that covers the entire United States (including Alaska and Hawaii), Puerto Rico, and US Virgin Islands. It also contains airport information for Guam, Midway Atoll, Northern Mariana Islands, Wake Island, and American Samoa.

9.3.1 Determine the Current Position

Determining the current position can be accomplished via a few different means: radiosonde or basestation GPS, handheld GPS, a car navigation GPS (such as a TomTom), a map, or an aeronautical chart. The most accurate are GPS devices.

To view the current position in iMetOS, go to the View | View GPS Information screen (in Real Flight mode).

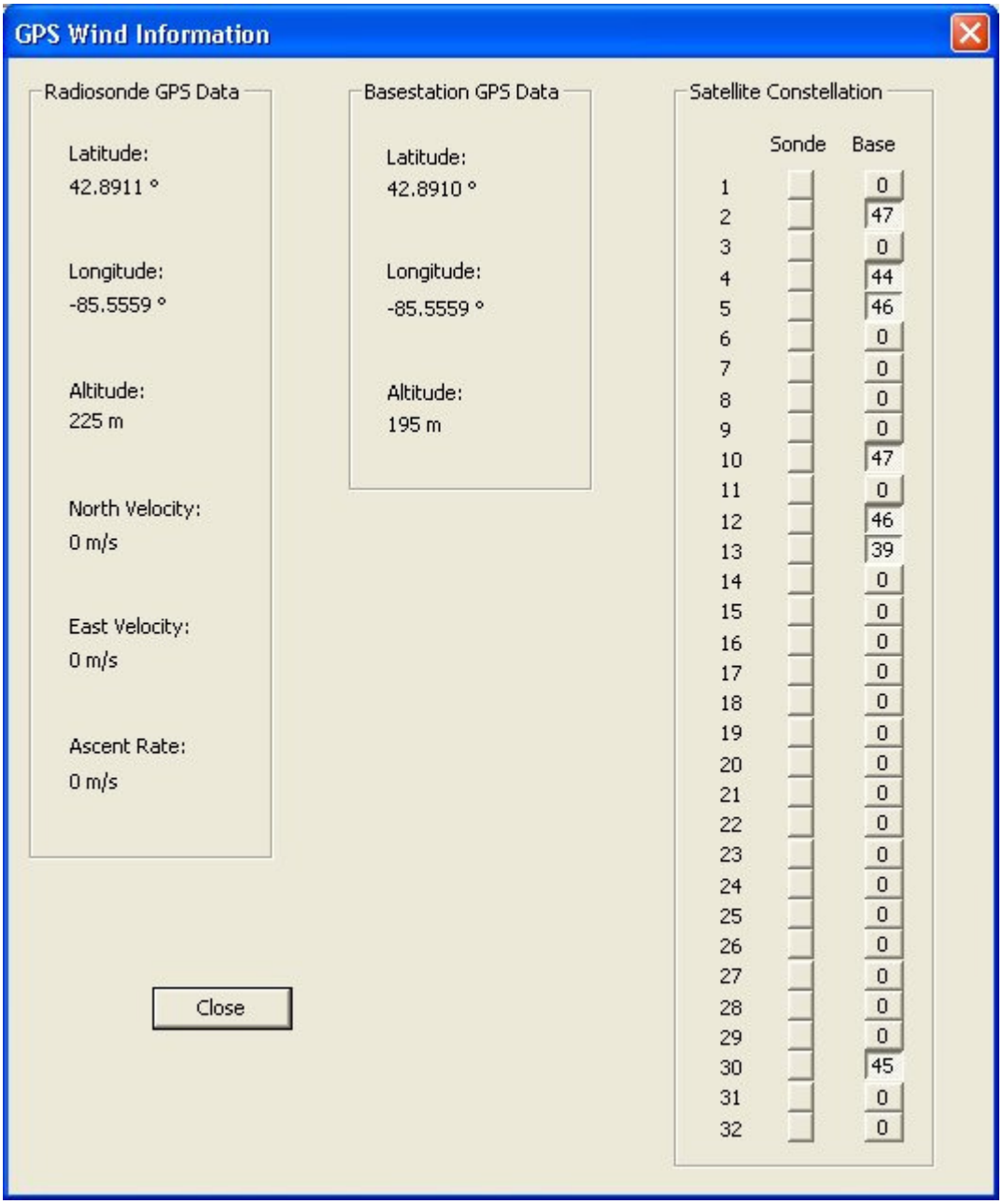


Figure 9-6: Radiosonde and Basestation GPS Position Listed

9.3.2 Is the Location Near an Airport?

After the current position is obtained, SkyVector can be used to determine if the location is near an airport

or under controlled airspace. To use SkyVector, perform these steps:

a. Open SkyVector (http://skyvector.com) in a web browser.

b. Click on [Flight Plan] and enter the latitude and longitude (i.e. "42.891069,-85.555935"). Note the lack of space after the comma. Click [Add].

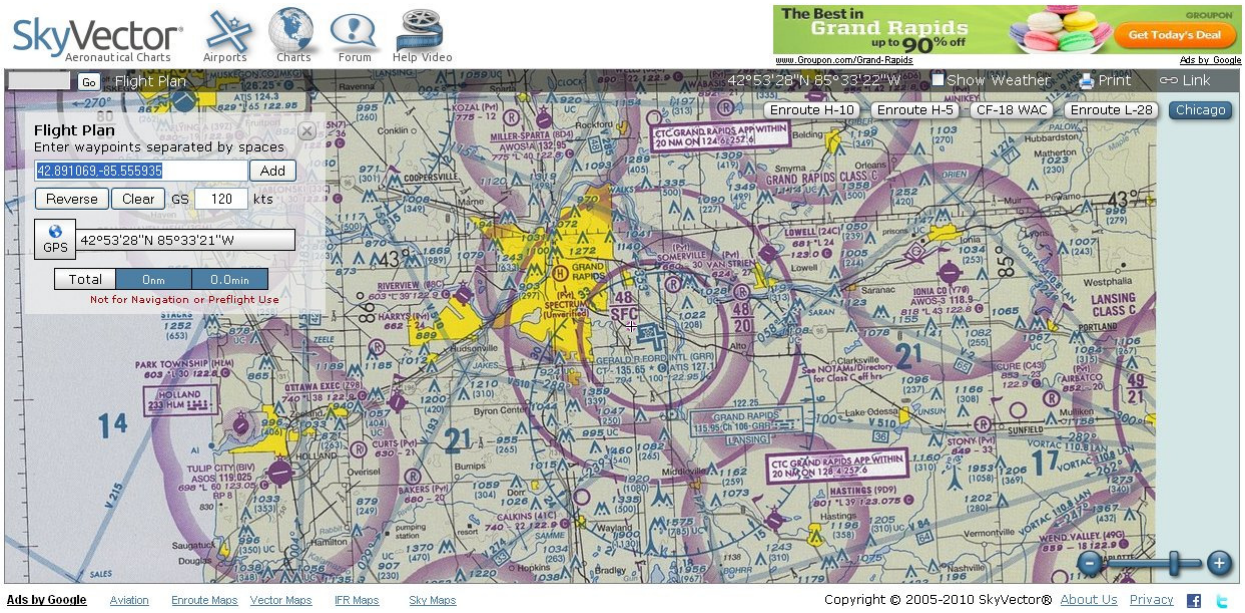


Figure 9-7: Location Entry into SkyVector

c. SkyVector will bring up the appropriate aeronautical chart and display the position entered with a magenta circle and cross hair, as shown in Figure 9-8.

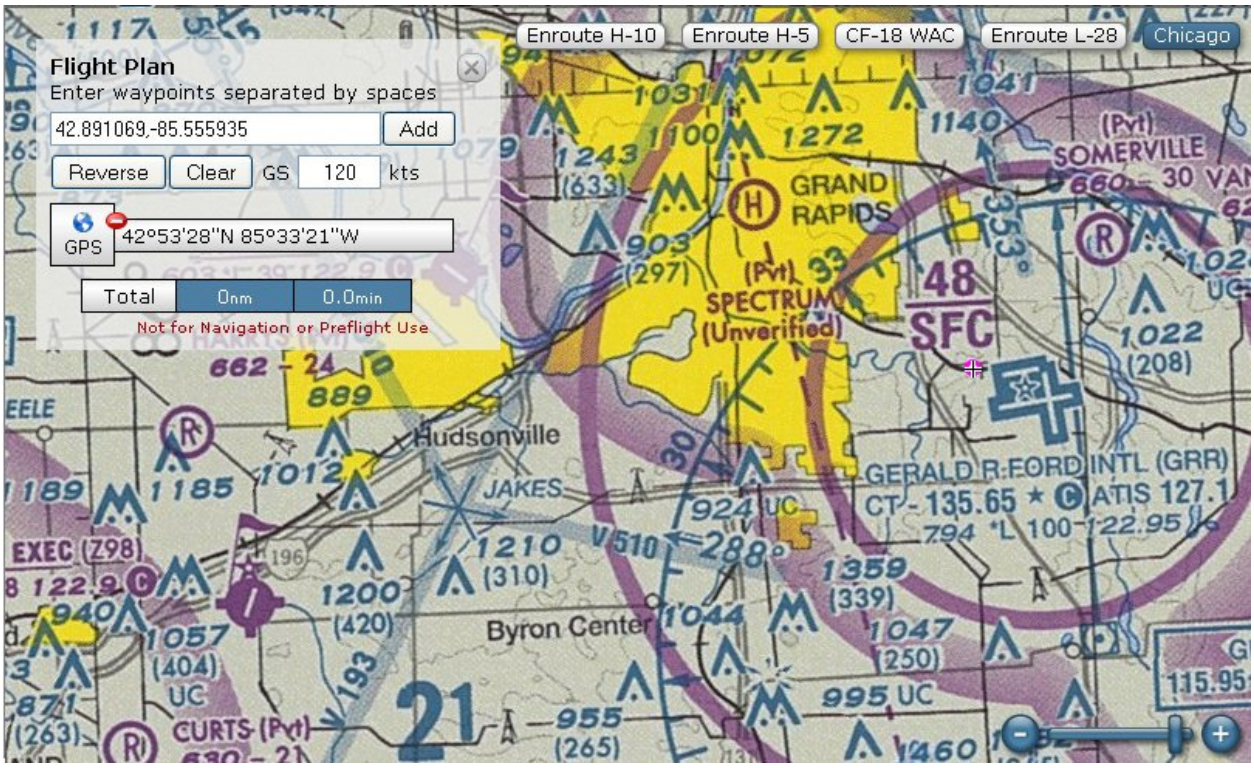


Figure 9-8: SkyVector Current Position

The current position shown is under Grand Rapids (GRR) Class C airspace.

9.3.3 Finding Air Traffic Control Contacts

Phone numbers to contact Air Traffic Control are generally unlisted, for safety purposes. Usually phone numbers to airports that are listed are general phone numbers. These can be found with either a phone book, an online phone book, or with SkyVector.

To find the airport phone number with SkyVector, perform the following steps:

a. Open SkyVector in a web browser, or keep the existing window open.

b. Click on [Airports] and enter the airport identifier ("GRR" from the above case) in the search button.

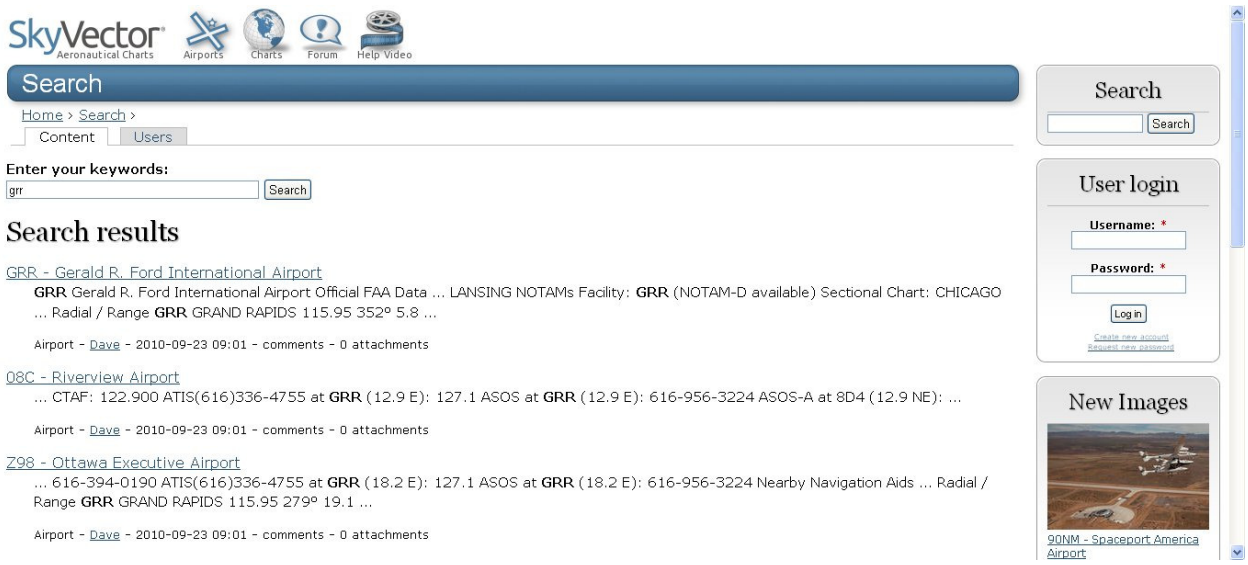

SkyVector
Aeronautical Charts
Airports
Charts
Forum
Help Video
Search
Home › Search ›
Content
Users
Enter your keywords:
grr
Search
Search results
GRR - Gerald R. Ford International Airport
GRR Gerald R. Ford International Airport Official FAA Data ... LANSING NOTAMs Facility: GRR (NOTAM-D available) Sectional Chart: CHICAGO ... Radial / Range GRR GRAND RAPIDS 115.95 352° 5.8 ...
Airport - Dave - 2010-09-23 09:01 - comments - 0 attachments
08C - Riverview Airport
... CTAF: 122.900 ATIS(616)336-4755 at GRR (12.9 E): 127.1 ASOS at GRR (12.9 E): 616-956-3224 ASOS-A at 8D4 (12.9 NE): ...
Airport - Dave - 2010-09-23 09:01 - comments - 0 attachments
Z98 - Ottawa Executive Airport
... 616-394-0190 ATIS(616)336-4755 at GRR (18.2 E): 127.1 ASOS at GRR (18.2 E): 616-956-3224 Nearby Navigation Aids ... Radial / Range GRR GRAND RAPIDS 115.95 279° 19.1 ...
Airport - Dave - 2010-09-23 09:01 - comments - 0 attachments
Search
Search
User login
Username: *
Password: *
Log in
Create new account
Request new password
New Images
90NM - Spaceport America Airport

Figure 9-9: GRR Search Results

Figure 9-9 shows the search links on SkyVector for the airport "GRR". Clicking on the first link gives all sorts of information for GRR, including the Ownership Information shown in Figure 9-10.

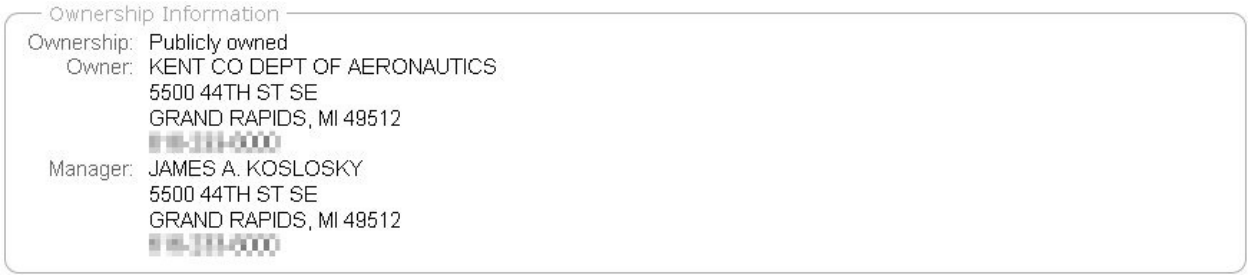


Figure 9-10: GRR Ownership Information

Once the user has obtained a general number to the airport, call that number and explain that a weather balloon launch will occur at the user's position. Ask for phone number to the control tower to ask permission for launch. Do not give airport control tower phone number to others!

CHAPTER 10
CONTACTING SUPPORT

10.1 IDENTIFYING PROBLEMS

InterMet Systems prides itself in making itself available to the customers' needs before, during, and after the installation of equipment. InterMet Support may be contacted by email, phone or fax.

10.2 MEANS OF CONTACT

Email: support@intermetsystems.com

Phone: +1 (616) 285-7810 x 0 – Ask for Customer Support

Fax: +1 (616) 957-1280

10.3 WHAT TO SEND

When contacting support, it is advisable to give us a thorough explanation of the problem and what steps were being taken that caused the problem.

E-mail provides the best means to contacting support, as log files and data can be sent electronically to InterMet Systems. When a problem occurs, please attach the following to an e-mail (in a .zip file), as this will provide InterMet Systems with the most amount of data:

- A full archive of the flight (if possible) – otherwise, all flight files for the flight in question from the C:\IMS\iMetOS\Flights directory.
- All .log files from the C:\IMS\iMetOS\MetServer directory.
- The MetServer.cfg file from the C:\IMS\iMetOS\MetServer directory.
- All .cfg files from the C:\IMS\iMetOS directory.
- All .log files from the C:\IMS\iMetOS directory.